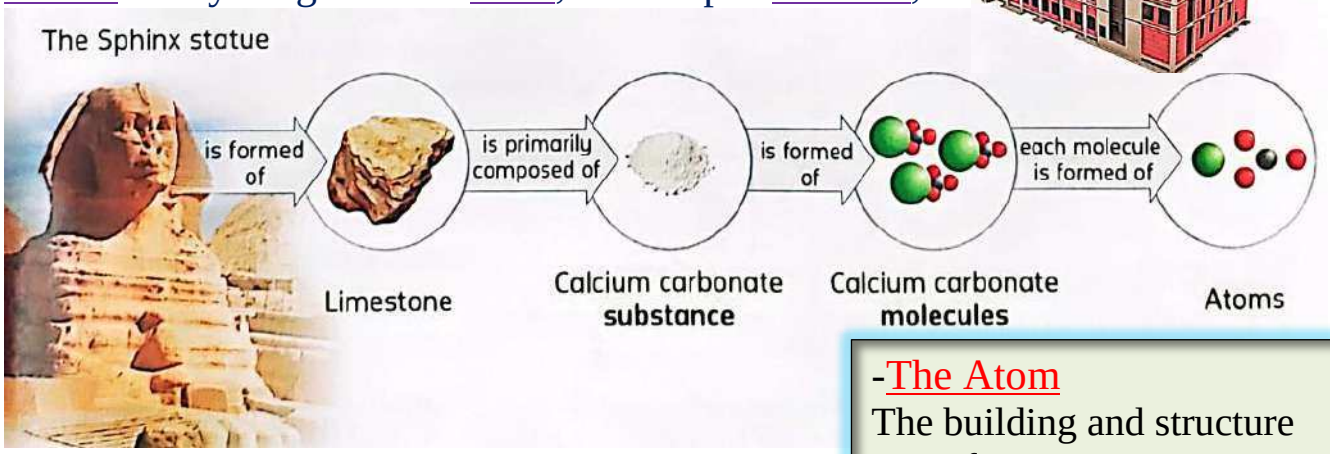
Unit (1) the Matter

Lesson (1) the structure of the atom

Brick is building unit of the house

The atom is the building unit of matter

Matter is anything that has mass, or occupies volume,.

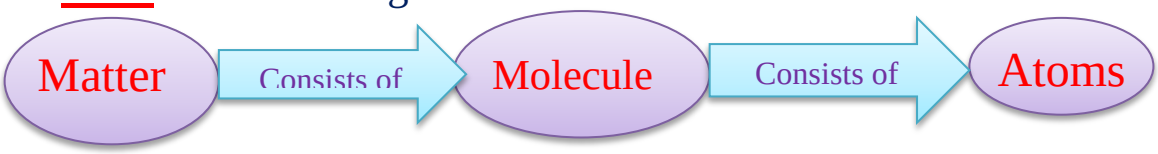


-The Atom
The building and structure unit of any matter

the Sphinx and the Giza Pyramids behind it, are made up of calcium carbonate.

What are the smallest units that make up molecules?

The **atom** is the building unit and structure of all matter.



In Ancient Times: The Greek philosophers believed that the matter was formed of small, indivisible parts called atoms.

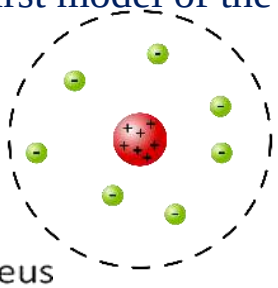
في العصور القديمة: اعتقد الفلاسفة اليونانيون أن المادة تتكون من أجزاء صغيرة غير قابلة للتجزئة تُسمى الذرات.

In the Early 19th Century: The scientist Dalton proposed the first scientific atomic theory, stating that atoms are indivisible.

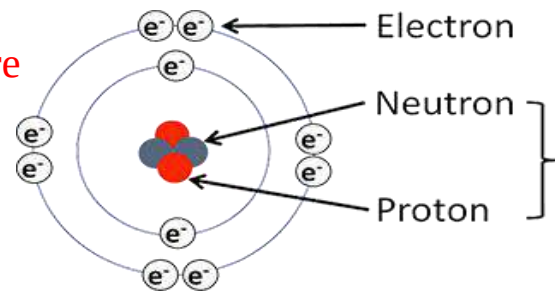
في أوائل القرن التاسع عشر: اقترح العالم دالتون أول نظرية علمية للذرة، مؤكدًا أن الذرات غير قابلة للتجزئة.

In 1909: **The scientist Rutherford** proposed the first model of the atom based on an experimental basis.

في عام ١٩٠٩: اقترح العالم رذرفورد أول نموذج للذرة قائم على أساس تجريبي.



Atom structure



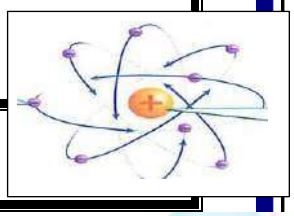
Mr: Alifaz.N. Tadrous
01005136959- 01222978682

D.M.RAZK موقع الدكتور محمد رزق معلم الكيمياء التعليمي

Nucleus very small space in the atom that contains protons and neutrons. electrons revolve around it at high speeds In energy levels

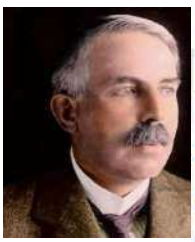
النواة، مساحة صغيرة جدًا في الذرة تحتوي على بروتونات ونيوترونات. تدور الإلكترونات حولها بسرعات عالية في مستويات الطاقة

Nucleus has	Electrons
Protons positively charged. Neutrons neutral in charge.	very small masses revolve around nucleus in Energy levels Negatively charged particles.
Protons, neutrons, and electrons are subatomic particles في مستويات الطاقة. البروتونات والنيوترونات والإلكترونات هي جسيمات ذرية مهملة	



If we represent the size of an atom to the size of a baseball stadium, the volume of the nucleus is represented by the size of a pin head in the middle of the field

إذا مثلنا حجم الذرة بحجم ملعب البيسبول، يتم تمثيل النواة بحجم...
رأس دبوس في منتصف الملعب



Ernest Rutherford New Zealand scientist 1871 AD.
He won the Nobel Prize in Chemistry in 1908 died in 1937

رذرفورد عالم نيوزيلندي ولد سنة 1871م .
حصل على جائزة نوبل في الكيمياء سنة 1908م توفي سنة 1937م.

New Zealand honored the scientist Rutherford By placing his image on its largest currencies, for his efforts in discovering the structure of the atom.

كرّمت نيوزيلندا العالم رذرفورد بوضع صورته على أكبر عملاتها تقديراً لجهوده في اكتشاف بنية الذرة.

Activity 2 Interpret

The particle	Symbol	Relative electric charge	The mass
Proton	p	+1	µ1
Neutron	n	0	µ1
Electron	e-	-1	$\frac{1}{1836}$ µ

G.R (1) Why is the nucleus of the atom described as positively charged?

Because it has positive protons

لماذا توصف نواة الذرة بأنها موجبة الشحنة؟ لأنها تحتوي على بروتونات موجبة

G.R (2) atom is electricity neutral in the ordinary state ?

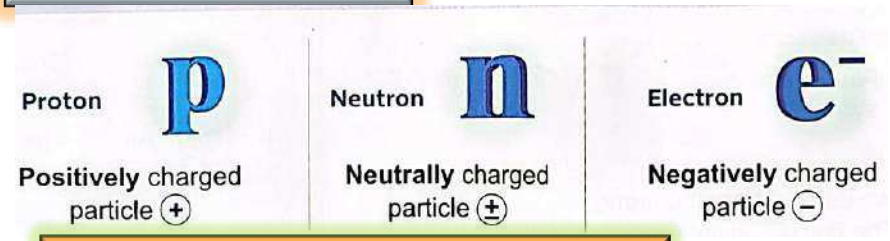
Because the number of negative electrons = the number of positive protons

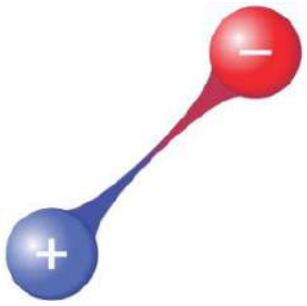
الذرة متعادلة كهربيا فى الحالة العادية؟ لأن عدد الإلكترونات السالبة = عدد البروتونات الموجبة

G.R (3) The mass of the atom is concentrated in the nucleus.

Because the mass of electrons is very small when compared to the mass of protons or neutrons

تتركز كتلة الذرة في النواة لأن كتلة الإلكترونات صغيرة جدًا مقارنة بكتلة البروتونات أو النيوترونات





We conclude from the above that

The charge of the proton is equal to the charge of the electron in quantity, but different in type.

نستنتج مما سبق أن شحنة البروتون تساوي شحنة الإلكترون في الكمية ولكنها تختلف في النوع:

The masses of subatomic components are given in atomic mass units (μ).

تعطى كتل المكونات تحت الذرية بوحدات الكتلة الذرية(μ)

The mass of electrons is neglected (very small) of an atom because it is Not important compared to the mass of protons or neutrons.

يتم إهمال كتلة الإلكترونات لأنها غير مهمة مقارنة بكتلة البروتونات أو النيوترونات.

Elements symbols

Scientists have agreed to express elements with symbols that facilitate their expression and dealing with them, especially in chemical equations. the names of some elements in three languages and the chemical symbols for these elements.

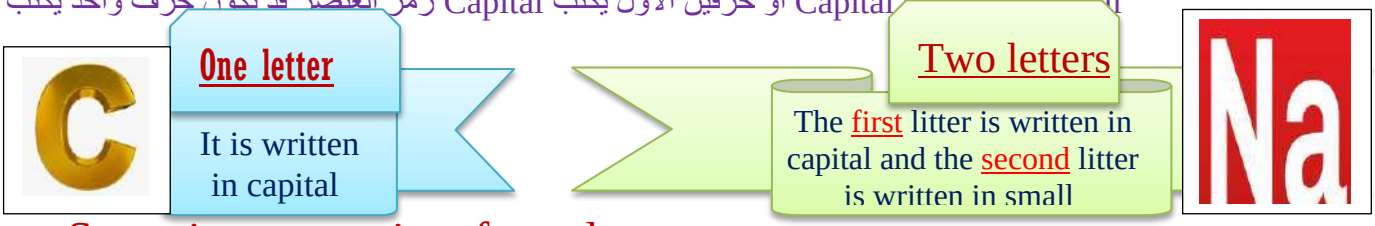
The name of the element in the language		Symbol	The name of the element in the language		Symbol
Latin	English		Latin	English	
Carbo	Carbon	C	Natrium	Sodium	Na
Nitrogenium	Nitrogen	N	Kalium	Potassium	K
Chlorum	Chlorine	Cl	Cuprum	Copper	Cu
Chromium	Chromium	Cr	Ferrum	iron	Fe

from 2 Tables we conclude that: من الجدولين نستنتج أن

The element symbol may be one letter, written Capital,

or two letters, the first written Capital and the second written Small

رمز العنصر قد يكون حرف واحد يكتب Capital أو حرفين الأول يكتب Capital والثاني يكتب Small


C
One letter
It is written in capital
Two letters
The first litter is written in capital and the second litter is written in small
Na

Some items consist of two letters.

To differentiate between them, because some elements share the first letter

تكون رمز بعض العناصر من حرفين للتمييز بينهما، لأن بعض العناصر تشترك في الحرف الأول

If two elements are similar in their initial letters, so the second letter is taken to differentiate between them, like:-

1- Carbon (C) and Calcium (Ca) 2- Sulphur(S) and silicon (Si)

3- Hydrogen (H) and Helium (He)

Some symbols of elements are represented by the first and second letter of Latin name like:

1-Sodium (Natrium)=Na 2-Iron (Ferrum)=Fe

3-Copper (Cuprum)= Cu 4-Potassium (Kaluim)=K

G .R The ymbol of The element's symbol represents its name in English.

رمز العنصر يمثل اسمه باللغة الإنجليزية.

When the name of an element differs in English from Latin, it is symbolized according to the letters of its name in Latin.

عندما يختلف اسم العنصر باللغة الإنجليزية عن اللاتينية يرمز له حسب حروف اسمه باللغة اللاتينية

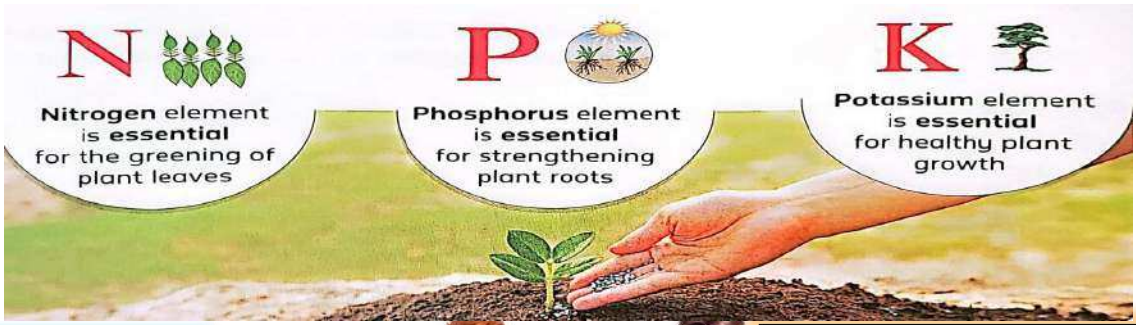
The element	Symbol	The element	Symbol	The element	Symbol
Lithium	Li	Oxygen	O	Gold	Au
Sodium	Na	Calcium	Ca	Helium	He
Potassium	K	Magnesium	Mg	Argon	Ar
Hydrogen	H	Zinc	Zn	Neon	Ne
Silver	Ag	Lead	Pb	Mercury	Hg
Fluorine	F	Barium	Ba	Iron	Fe
Chlorine	Cl	Aluminum	Al	Carbon	C
Bromine	Br	Silicon	Si	Sulphur	S
Iodine	I	Copper	Cu	Phosphorus	P

Fertilizers are chemical compounds used to improve Agricultural production

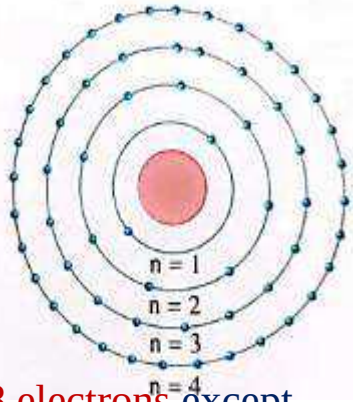
الأسمدة هي مركبات كيميائية تستخدم لتحسين الإنتاج الزراعي...

NPK fertilizers is, composed

Nitrogen (N)النيتروجين	Phosphorus (P)الفوسفور	Potassium (K)البوتاسيوم
Necessary for the green of plant leaves. الضروري لتخضير أوراق النبات	Necessary to strong roots الضروري لتقوية الجذور	Necessary for healthy plant growth الضروري لنمو النبات الصحي


N
Nitrogen element is essential for the greening of plant leaves
P
Phosphorus element is essential for strengthening plant roots
K
Potassium element is essential for healthy plant growth

Energy level



Each energy level can take a definite number of electrons this number can be calculated from the relation $(2n^2)$ where (n) is the number of the energy level.

The no. of electrons in 1st level (K) $=2\times (1)^2 = 2$ electrons
The no. of electrons in 2nd level (L) $=2\times (2)^2 = 8$ electrons
The no. of electrons in 3rd level (M) $=2\times (3)^2 = 18$ electrons
The no. of electrons in 4th level (N) $=2\times (4)^2 = 32$ electrons

The outermost energy level of any atom can't take more than 8 electrons except "K" level which can't take more than 2 electrons

G.R The rule $(2n^2)$ is not applied to calculate the number of electrons of the energy levels higher than four ?

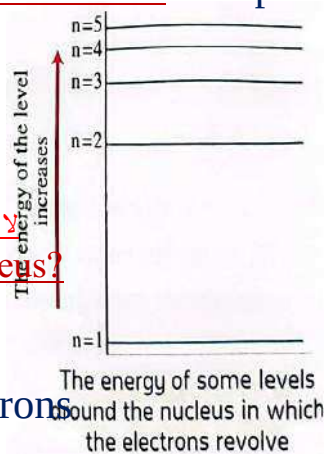
Because the atom become unstable

لا تطبق القاعدة $(2n^2)$ لحساب عدد الإلكترونات من مستويات الطاقة أعلى من الرابع؟ لأن الذرة تصبح غير مستقرة

What happens to the electron's energy as it moves away from the nucleus?

the electron's energy increase

ماذا يحدث لطاقة الالكترون عندما يبتعد عن النواة؟ تزداد طاقة الالكترون

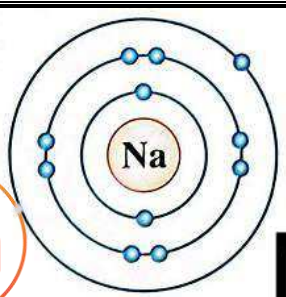


The energy of some levels around the nucleus in which the electrons revolve

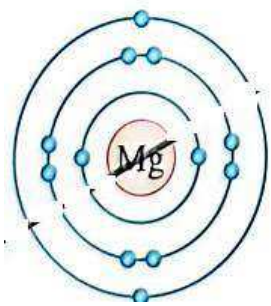
The outer energy level does not contain more than 8 electrons

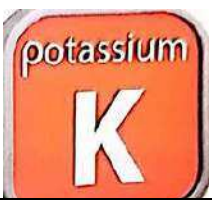
لا يحتوي مستوى الطاقة الخارجي على أكثر من 8 إلكترونات

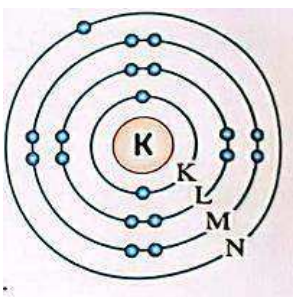
Level symbol	K	L	M	N	O	P	Q
Level number(n)	1	2	3	4	5	6	7
number of electrons	2	8	18	32			



Mg

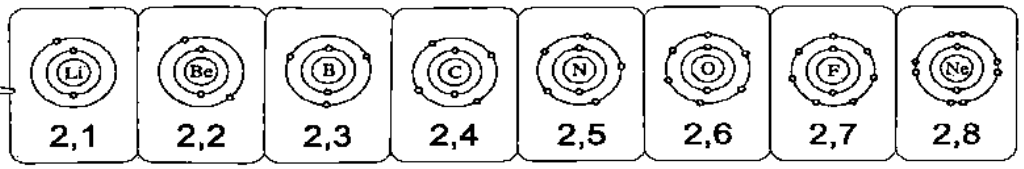




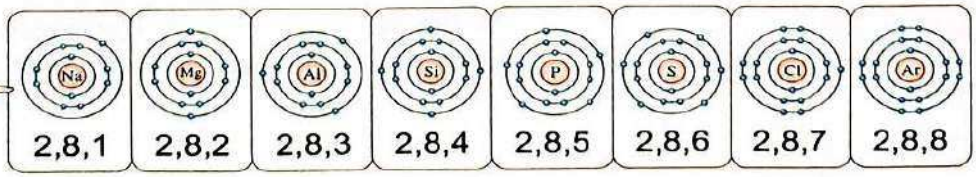


The elements	$_{7}N^{14}$	$_{20}Ca^{40}$	$_{13}Al^{27}$	$_{17}Cl^{35}$
Electronic configuration	7p 2 5	20p 2 8 8 2	13p 2 8 3	17p 2 8 7

The level (L) is filled with one electron and up to 8 electrons



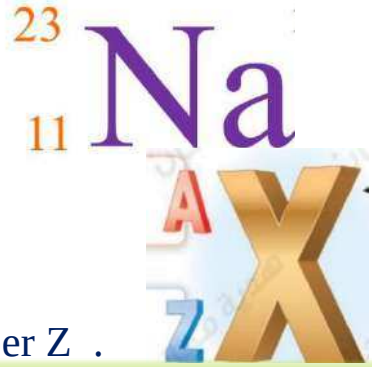
Filling the level (M) with one electron and up to 8 electrons, based on the number of electrons in the atom of each element



Atomic number The number of positive protons P = the number of negative electrons and written at the bottom left

Mass number The sum of the numbers of protons and neutrons

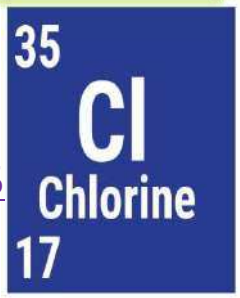
number of neutrons = mass number A - atomic number Z .



Mass number (A) = number of protons (p) + number of neutrons (n)
Atomic number (Z) = number of protons (p) = number of electrons (e)
Number of neutrons (n) = mass number (A) - atomic number (Z)

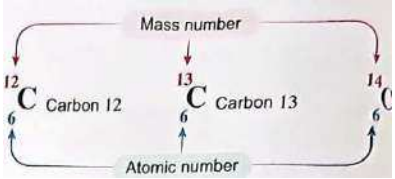
What is the mean by? The atomic number of chlorine = 17.
It means that The number of the positive protons inside the nucleus of the chlorine atom equals 17

What is the meaning of? The mass number of chlorine = 35
The sum of the number of the protons and neutrons inside the nucleus of the chlorine atom equals 35



The elements	$_{7}N^{14}$	$_{20}Ca^{40}$	$_{13}Al^{27}$	$_{17}Cl^{35}$
Mass number	14	40	27	35
Atomic number	7	20	13	17
The electrons	7	20	13	17
The protons	7	20	13	17
The neutrons	14-7=7	40-20=20	27-13=14	35-17=18
Electronic configuration	7p 7n — 2 5	20p 20n — 2 8 8 2	13p 14n — 2 8 3	17p 18n — 2 8 7

Isotopes



element may have different forms that equals in atomic number but differ in mass number. The difference is the number of neutrons in its nuclei. These forms are known as isotopes of the element.

Isotope symbol	$^{1}_{1}H$	$^{2}_{1}H$	$^{3}_{1}H$
Isotope name	Protium	Deuterium	Tritium
Components of isotope atom	Electron e⁻, Proton p	Electron e⁻, Proton p, neutron n	Electron, p, n

What is the only hydrogen isotope that does not have neutrons in its nucleus? Protium $_1H^1$

G.R. isotopes of the element differ in mass number?

Due to the difference in the numbers of neutrons in the nuclei of the element's isotopes.

Check your understanding

The elements	(1)	(2)	(3)	(4)	(5)
The protons	20	16	16	7	8
The neutrons	20	20	18	8	9

Which two atoms represent two isotopes of the same element?

(a) (1) , (2) . (b) (2) , (5). (c) (2) , (3). (d) (4) , (5).

Lesson(1)

1.Choose the correct answer:

(1) Each of the following is matter, except .....

a.air b. light c. sand d. table salt

(2)Which of the following is a characteristic of the nucleus of an atom

a.Positively charged b. Negatively charged

c. Contains negatively charged electrons d. Contains negatively charged protons

(3)The mass of a proton equals

a. 1 g b. 1 k g c. 1 u d. 1 m g

(4) The mass of the atom is approximately equal to the sum of masses of

a.the electrons and the protons b. the protons and the nucleons

c.the neutrons and the electrons d. the protons and the neutrons

(5) When comparing the charge of protons to the charge of electrons in an atom of any element, the charge of the protons is

a.Greater than the charge of the electrons and of the same type

b.Greater than the charge of the electrons and of an opposite type

c.Equal to the charge of the electrons in magnitude and of the same type

d.Equal to the charge of the electrons in magnitude and of an opposite type

(6)Which of the following groups of elements has chemical symbols starting with the letter A

a. Aluminum, Silver, and Lithium b. Gold, Mercury, and Silver

c. Gold, Aluminum, and Sodium d. Aluminum, Silver, and Gold

(7)Which of the following represents an element and its correct symbol

a. Potassium P b. Phosphorus F c. Nitrogen Ni d. Chromium Cr

(8) What are the elements that compose glucose $C_6H_{12}O_6$

a. Carbon, Helium, and Water b. Carbon, Hydrogen, and Oxygen

c. Calcium, Hydrogen, and Oxygen d. Copper, Hydrogen, and Oxygen

(9)Which two compounds do contain the three essential elements required for plant growth?

a. $(NH_4)_2SO_4$, $Ca(NO_3)_2$ b.$(NH_4)_3PO_4$, $Ca(NO_3)_2$

c. $(NH_4)_2SO_4$, KNO_3 d.$(NH_4)_3PO_4$, KNO_3

10- A fertilizer package contains the two compounds $(NH_4)_2SO_4$ and K_2SO_4 What are the essential elements for plant growth in this package

a. Nitrogen and Hydrogen b. Sulfur and Oxygen

c. Potassium and Nitrogen d. Potassium and Sulfur

11-The number of electrons that can saturate each energy level in an atom equals

a. three times the energy level number b. twice the square of the energy level number

c. twice the energy level number d. twice the cube of the energy level number

12-In the relation $(2n^2)$, the symbol (n) refers to

a. energy level number b. number of electrons

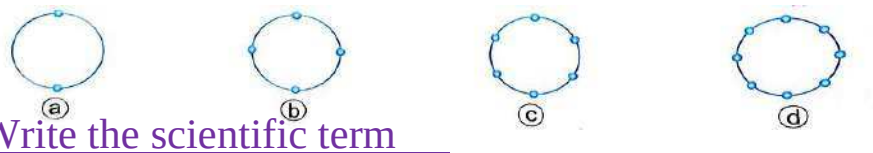
c. number of protons d. element's symbol

13-In the atom of $_{12}Mg^{24}$ has
a.an atomic number equal to its mass number
b. a mass number equal to its number of neutrons
c. a number of protons equal to its number of neutrons
d. a number of energy levels equal to its number of electrons

14-The number of negatively charged particles in an aluminum atom $_{13}Al^{27}$
a. 13 b. 14 c. 20 d. 27

15-The energy level L in a silicon atom ($_{14}$Si) contains
a. 2e- b. 3e- c. 8e- d. 18e-

16-Which figure represents the outermost energy level of a sulfur atom (S^{32})



(2) Write the scientific term

From building units to chemical symbols of elements

1-Anything that has mass and volume, and occupies space
2-The building and structure unit of any matter
3-The first scientific theory about the atom
4-The first model of the atom based on experimental basis
5-A New Zealand physicist who won the Nobel Prize in Chemistry in 1908
6-Positively charged particles found inside the nucleus of the atom
7-A subatomic particle whose charge can be neglected, but its mass cannot be neglected
8-Negatively charged particles in the atom with very tiny mass, revolving around the nucleus
9-A subatomic particle whose mass equals 1836
10- Chemical compounds that are used to improve agricultural production

From energy levels to isotopes

(11) Regions where electrons revolve around the nucleus according to their energy
12-A number written at the lower left side of an element's symbol, representing the .number of the positive protons found inside the nucleus of the element
13-The sum of the number of protons and neutrons that compose the nucleus atom
14-Different forms of the same element's atoms that have the same atomic number but differ in mass numbers

(3)Choose from column (B) what suits it in column (A)

(A)	(B)
(1) Potassium	1-An element whose nucleus of its isotope does not contain neutrons
(2) NPK	2-A substance from which limestone is made
(3) Calcium carbonate	3- An element essential for strengthening plant roots
(4) Phosphorus	4-A substance used to improve agricultural production
	5- An element essential for healthy plant growth

4-Give reason:

1-The nucleus of the atom is positively charged.

……

2-Isotopes of an element agree in atomic number but differ in mass number

……

(5) What does it mean that....

The mass number of oxygen is 16?

……

6 Correct the underlined words:

(1) The Sphinx statue is made of sandstone.

(2) Matter is composed of atoms, which in turn are composed of smaller units called molecules.

(3) The Greek philosophers believed that matter was made of indivisible parts called molecules.

(4) The masses of subatomic particles are measured in milliliters.

(5) The proton is the subatomic particle which has the smallest mass.

(6) The chemical symbol of magnesium is MG

(7) The nucleus of element $_{13}X^{27}$ contains 13 neutrally charged particles and 14 negatively charged particles.

(8) The nucleus of a tritium atom contains one proton and one neutron.

(9) Chlorine-37 differs from chlorine-35 in having a greater number of protons.

(7)Write the electron configuration for the atoms of the following elements

a. $_{11}Na^{23}$ b. $_{20}Ca^{40}$

(8)Correct the underlined words in the following phrases

1-Energy level K is saturated with 3 electrons

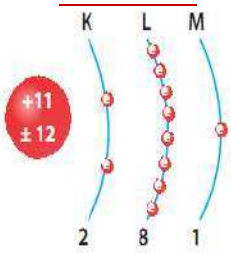
2-The energy of a level decreases as we move away from the nucleus

3-There are no neutrons in the tritium nucleus

4-Nuclei of isotopes of one element contain the same number of neutrons

(9) Study the corresponding figure, then conc

1-atomic number 2- mass number



Lesson (2) Attempts to classify elements

Attempts to classify elements محاولات تصنيف العناصر

G.R. There have been many attempts by scientists to classify elements?
لقد كانت هناك محاولات عديدة من قبل العلماء لتصنيف العناصر؟

To facilitate studying them and deducing relationships between elements and their physical and chemical properties
لتسهيل دراستها واستنتاج العلاقات بين العناصر وخواصها الفيزيائية والكيميائية.

Attempts to categorize the elements

1- The periodic table of Mendeleev

2- The Periodic Table of Moseley

3- The Modern periodic table

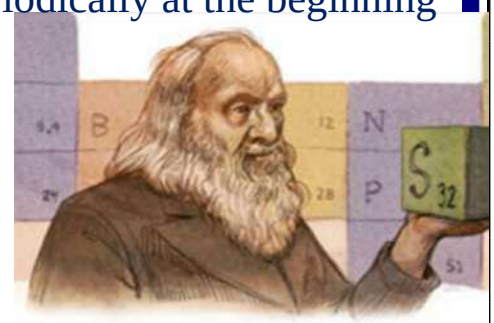
1-Mendeleev table جدول مندلييف

The Mendeleev periodic table

- the first true periodic table for classifying elements,
- the elements were arranged in ascending order according to their atomic masses without a regular progression when moving from the left of the table to its right in the horizontal rows.

يعتبر جدول مندلييف الدوري أول جدول دوري حقيقي لتصنيف العناصر، حيث تم ترتيب العناصر فيه تصاعدياً حسب كتلها الذرية دون تقدم منتظم عند الانتقال من يسار الجدول إلى يمينه في الصفوف الأفقية

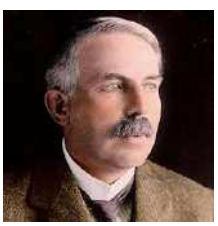
It was discovered that their properties were repeated Periodically at the beginning of each new row
وقد اكتشف أن خصائصها تتكرر دوريًا في بداية كل صف جديد..



Scientist Dmitri Mendeleev
العالم دميتري مندلييف

- Russian scientist عالم روسي
-He published his periodic table of the elements in 1869
نشر جدوله الدوري للعناصر في عام 1869
-He was honored 48 years after his death by naming one of the discovered elements after his death (Mendelevium Md)
- تم تكريمه بعد 48 عامًا من وفاته بتسمية أحد العناصر المكتشفة باسم وفاته (مندلييفيوم Md)

2- Moseley table جدول موزلى



Rutherford discovered that the nucleus of atom contains positively charged protons
اكتشف رذرفورد ان نواة الذرة يوجد بها بروتونات موجبة الشحنة

- - Most important modifications of Moseley to Mendeleev's table

اهم تعديلات موزلي على جدول مندليف

1-Arrange the elements in ascending order of their atomic numbers, so that the atomic number of each element is greater than that of the element preceding it in the same cycle by one whole number

1 رتب العناصر ترتيبا تصاعديا حسب أعدادها الذرية، بحيث يزيد العدد الذرى لكل عنصر عن العنصر الذي يسبقه في نفس الدورة بمقدار واحد صحيح

2-He added to the table أضاف إلى الجدول

-Inert gas group مجموعة الغازات الحاملة

-Other elements discovered after Mendeleev prepared the periodic table

العناصر الأخرى التى تم اكتشافها بعد إعداد مندليف لجدولة الدوري.

3-Modern periodic table الجدول الدوري الحديث

The elements were rearranged in an ascending order according to

تم ترتيب العناصر تصاعديا حسب

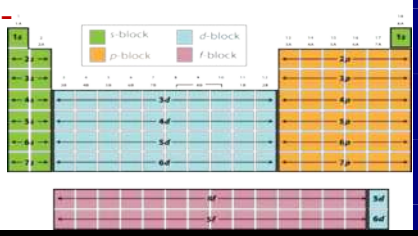
A- their atomic numbers أعدادها الذرية

B-the method of filling the sub-energy levels with electrons in the current modern periodic table

- طريقة ملء المستويات الفرعية للطاقة بالإلكترونات في الجدول الدوري الحديث الحالي

It consists of 7 horizontal periods and 18 vertical groups occupied by 118 elements

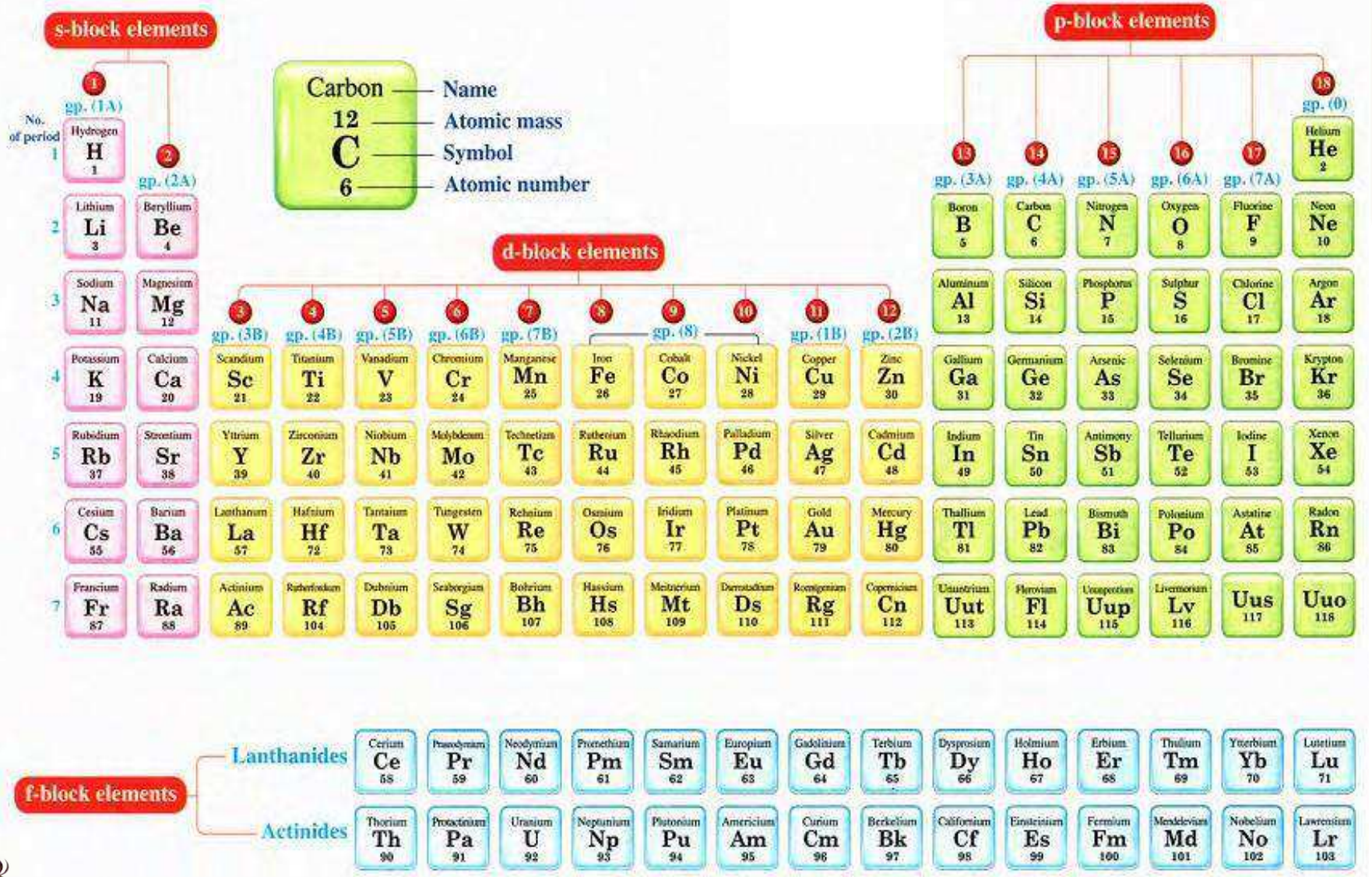
يتكون من 7 مجموعة أفقية و18 مجموعة رأسية تشغلها 118 عنصرا



The periodic table is divided into 4 main parts

S-block elements	P- block elements	d- block elements appear from period 4	F- block elements
(located on left side of the period table) توجد على الجانب الأيسر من الجدول الدورى	(located on right side of the period table) توجد على الجانب الأيمن من الجدول الدورى	(located in the middle of the period table) توجد وسط من الجدول الدورى start appear from period four (4)	located below the period table) توجد اسفل الجدول الدورى
2 groups are take the symbol A (1 A- 2 A) مرتبة إلى مجموعتين تاخذ الرمز A	6 groups are take the symbol A Except the zero group (inert gas) (3A - 4A -5A -6A -7A –zero group يرمز إليها الرمز A باستثناء مجموعة الصفر (غاز خامل)	10 groups are take the symbol B transitional elements they separate between S-block and P-block (3B -4B -5B -6B -7B -8- 1B -2B) مرتبة إلى 10 مجموعات الذي يرمز إليه الرمز B تسمى العناصر الانتقالية أنها تفصل بين الفئة S- و الفئة P -	14 groups Include Lanthanides and actinides مرتبة إلى 14 مجموعة تتضمن اللانثانيدات والأكتينيدات

Blocks of Modern Periodic Table



First term
D.M.RAZK
موقع الدكتور محمد رزق معلم الكيمياء
Mr: Alifaz.N. Tam
01005136959- 01222978602

The element molecules in the periodic table (solids- Liquid- Gaseous)_

Solid elements	Liquid elements		Gaseous elements	
monoatomic solid elements are composed of one atom as:- Iron (Fe) Sulphur (S) Magnesium(Mg) Aluminum (Al) Carbon (C) Copper (Cu)	One atom monoatomic	two atoms Diatomic	one atom monoatomic	2-two atoms Diatomic
	Mercury (Hg) is the liquid metal element	Bromine (Br) is the liquid non-metal element	as noble (inert) gases Helium(He)- Neon(Ne)- Argon(Ar)- Krypton(Kr) Xenon(Xe)- Radon(Ra)	active gases Hydrogen(H_2) Oxygen(O_2) Nitrogen(N_2)- Chlorine(Cl_2)

.Classify the gaseous elements in the periodic table

	Inert gases						Active gases				
elements symbol	He	Ne	Ar	Kr	Ze	Rh	H	O	N	Cl	F
number	6 elements						5 elements				

Semi-element	Boron (B)	Silicon (Si)	Germanium (Ge)	Arsenic (As)	Antimony (Sb)	Tellurium (Te)
No of element period	3	3	4	4	5	5
No of element group	3A	3B	4A	4B	5A	5B

How to determine the atomic number of elements in group A given their positions in the periodic table

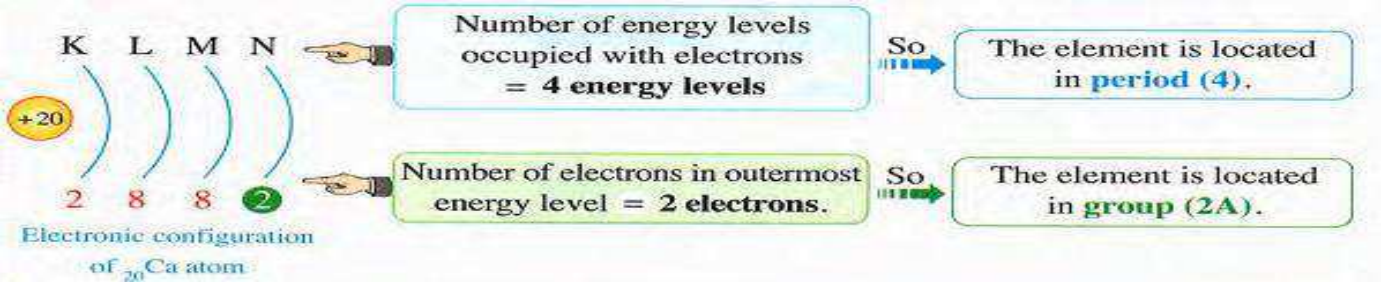
1-Detrmine the number of energy levels occupied by electrons in an atom of an element given the element's period number

2- Determine the number of electrons of the last energy level in the atom of the element given the group number of the element (according to the traditional numbering)

3-Write the electron configuration for the atom of the element, taking into account that the internal energy levels are complete with electrons

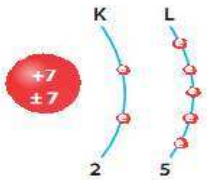
4-Calculate the total number of electrons rotating in the energy levels it represents Atomic number of the element

-The number of electrons rotating in energy levels (=) The number of protons inside the nucleus of an atom = The atomic number of the element


K L M N
+20
2 8 8 2
Electronic configuration of 20Ca atom
Number of energy levels occupied with electrons = 4 energy levels
So
The element is located in period (4).
Number of electrons in outermost energy level = 2 electrons.
So
The element is located in group (2A).

1-Calculate the atomic number for each

A-Element (X): located in period (2) and group (5A)

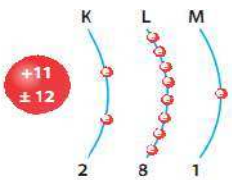


Period 2 The number of energy levels in its atom is 2 energy levels

group (5A) The number of electrons in the last energy level=5

Electronic configuration: 2.7 Atomic number =7

B-Element (Y): located in period (3) and group (1A)



Period 3 The number of energy levels in its atom is 3 energy levels

group (1A) The number of electrons in the last energy levels=1

Electronic configuration: 2.8.1 Atomic number =11

In one period in the modern periodic table

The atomic number of an element increases by 1 over the preceding element

In one of the 2. 3 period groups in the modern periodic table

The atomic number of an element increases by 8 over the preceding element

Could scientists discover a new element between sulfur $_{16}S$ and chlorine $_{17}C1$

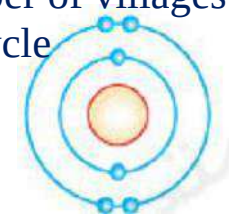
No. Because the atomic number of an element is an integer quantity and it increases in one cycle from one element to the next by only one correct amount

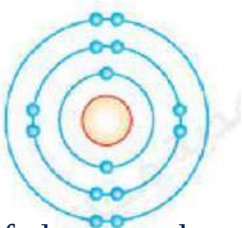
Question and answer

The corresponding figure that shows the electron(x) configuration and the period of the element then deduce the number of villages

- The element (Y) that follows it in the same cycle

-The next element (Z) in the same group





The atomic number of the element (X) =2+4=6

The atomic number of element (Z) is =2+8+4=14

Lewis Dot Structure for Valence Electrons

The scientist Lewis proposed a simplified method to represent the number of electrons that are found in the last energy level around the element symbol, known as valence electrons, using dots (.) which are distributed on the four sides of the element symbol, individually .(singly) first, and then they are paired up until they are completely distributed

بنية لويس النقطية لإلكترونات التكافؤ

اقترح العالم لويس طريقة مبسطة لتمثيل عدد الإلكترونات الموجودة في مستوى الطاقة الأخير حول رمز العنصر، والمعروفة باسم إلكترونات التكافؤ، باستخدام نقاط (.) موزعة على الجوانب الأربعة لرمز العنصر، بشكل فردي أولاً، ثم تُقترن حتى تكتمل.

Valence Electrons إلكترونات التكافؤ

They are the electrons found in the last energy level of the element

الإلكترونات الموجودة في مستوى الطاقة الأخير للعنصر

It is possible to conclude the valency of an element from the number of the unpaired (single) electrons in its Lewis structure

يمكن استنتاج تكافؤ عنصر ما من عدد الإلكترونات غير المزدوجة (المفردة) في بنيته لويس.

The electronic distribution of atoms of elements indecate their properties

التوزيع الإلكترونى لذرات العناصر يعكس خواصها

The chemical properties of elements depend on the number of electrons in the last energy level of their atoms, while

تعتمد الخصائص الكيميائية للعناصر على عدد إلكترونات مستوى الطاقة الأخير الذراتها

The difference in the number of neutrons in the nuclei of their atoms leads to differences in some of their physical properties.

يؤدى اختلاف عدد النيوترونات في أنوية ذراتها إلى اختلاف بعض خواصها الفيزيائية

The following two tables show the gradation of some of the physical properties of some alkali metals and halogens

والجدولان التاليان يوضحان تدرج بعض الخواص الفيزيائية لبعض فلزات الأقلاء والهالوجينات .

Alkali metals	Atomic radius	Melting point	Boiling point
Lithium $_{3}Li$ 2 , 1	157 pm	181°C	1347°C
Sodium $_{11}Na$ 2 , 8 , 1	191 pm	98°C	883°C
Potasium $_{19}K$ 2 , 8 , 8 , 1	235 pm	64°C	774°C
	Increases ↑	Decreases ↓	Decreases ↓

By increasing the atomic number

Halogens	Atomic radius	Melting point	Boiling point
Chlorine $_{17}Cl$ 2 , 8 , 7	99 pm	– 101°C	– 34°C
Bromine $_{35}Br$ 2 , 8 , 18 , 7	114 pm	–7°C	59°C
Iodine $_{53}I$ 2 , 8 , 18 , 18 , 7	133 pm	114°C	184°C
	Increases ↑	Increases ↑	Increas ↑

By increasing the atomic

From the two previous tables we conclude that

1-Atomic radius in same group The radius of atoms of elements of the same group increase with increasing atomic number (from top to bottom of the group)

نصف القطر الذري في المجموعة الواحدة يزداد نصف قطر ذرات عناصر المجموعة الواحدة بزيادة العدد الذري (من أعلى المجموعة إلى أسفلها)

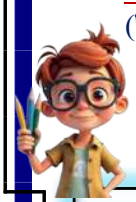
2-melting and boiling points درجات الانصهار والغليان

A-In alkali metals The melting and boiling points of alkali metals decrease with increasing atomic number from top to bottom of the group

في الفلزات القلوية تقل درجات انصهار وغليان الفلزات القلوية بزيادة العدد الذري من أعلى المجموعة إلى أسفلها

B- In halogens The melting and boiling points of halogens increase with increasing atomic number (from top to bottom of the group)

في الهالوجينات - تزداد درجات انصهار وغليان الهالوجينات بزيادة العدد الذري (من أعلى المجموعة إلى أسفلها)



The relationship between the physical state and its melting and boiling points relative to room temperature (25)

physical state of matter	Melting point ºC	Boiling point ºC
Solid	greater than 25 ºC	
Liquid	less than 25 ºC	greater than 25 ºC
Gases	less than 25 ºC	

Give Reason

1-The melting and boiling points of lithium and potassium above room temperature

Because both are solids at room temperature

درجة انصهار وغليان الليثيوم والبوتاسيوم أعلى من درجة حرارة الغرفة لأن كلاهما صلبان في درجة حرارة الغرفة

2-The melting and boiling points of chlorine are less than Room temperature

Because it is a gaseous element at room temperature

درجة انصهار وغليان الكلور أقل من درجة حرارة الغرفة لأنه عنصر غازي في درجة حرارة الغرفة

:Q From the table opposite: Deduce the physical state of each of the following

	(Y)	(X)
Melting point ºC	-7.2	-218
Boiling point ºC	58.8	-183

The melting point of element (X) is lower than room temperature Its boiling point is higher than room temperature Element (X): Liquid

Both the melting and boiling points of element (Y) are below room temperature Element (Y): Gas

3-Chemical activity النشاط الكيميائي

A-in two groups alkali metals and alkaline earth metals

في مجموعتين الفلزات القلوية والفلزات الاقلاء الارضية

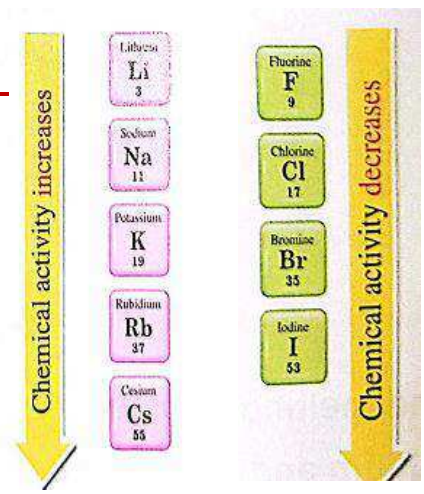
The chemical activity of metals increases by increasing atomic number

(From top to bottom of the group)

يزداد النشاط الكيميائي للفلزات بزيادة العدد الذري(من أعلى المجموعة إلى أسفلها)

The chemical activity of the alkali earth metals is less than for the very active alkali metals

يكون النشاط الكيميائي للفلزات القلوية الترابية أقل من الفلزات القلوية النشطة جدًا



B- In the halogen group في مجموعة الهالوجينات :

The chemical activity of non-metals decreases with increasing atomic number

(From top to bottom of the group)

يقل النشاط الكيميائي للفلزات اللافلزية بزيادة العدد الذري(من أعلى المجموعة إلى أسفلها)

Activity of the halogens Activity of the alkali metals Cesium is the most active of the .metals, while fluorine is the most active of the non-metals

نشاط الهالوجينات نشاط الفلزات القلوية السيزيوم هو أكثر الفلزات نشاطًا، بينما الفلور هو أكثر الفلزات نشاطًا

Lesson two

1-Choose the correct answer:

.Attempts to classify elements and the modern periodic table

1-A table in which the elements are arranged in ascending order according to their atomic masses (……)

2-The first true periodic table for classifying the elements(……)

3-A table in which the elements are arranged in ascending order according to their atomic numbers (……)

4-A table in which the elements are arranged in ascending order according to their atomic numbers and the way of filling the sub levels by electrons (……)

5-Horizontal rows in the modern periodic table (……)

6-Vertical columns in the modern periodic table (……)

7-Metals located at the far left of the modern periodic table(……..……)

8-Elements of group 7 in the modern periodic table (……)

9-The block to which the halogen elements belong (……)

10-Elements whose electron configuration ends with 5. 6.7 electrons (……)

11-Elements in the p-block that cannot be identified by the number of electrons in the outer energy level(……)

Periodic table, electronic distribution of elements and their properties

12-Electrons of the last energy level of the element atom(……)

13-Dot representation of valence electrons around the element symbol (……)

14-The number of unpaired electrons in the Lewis structure of the element (……)

2-Write the name that indicates each of the following phrases

Attempts to classify the elements and the modern periodic table

1-A scientist who arranged the elements in his table in ascending order according to their atomic masses (……)

2-A scientist discovered that the nucleus of the atom contains positively charged protons (……)

3-A scientist added the zero group to the periodic table(……)

4-The only liquid metal in the modern periodic table(……)

5-The only liquid nonmetal in the modern periodic table (……)

6-An element located between lithium and potassium in the alkali metal group (……..……)

7-The only metalloid in period 3 of the modern periodic table
8-An element whose electrons are distributed in 3 energy levels, and the last energy level in its atom is complete with electrons(……)
9-An alkali metal located in period 2 (……)

Periodic table, electronic distribution of elements and their properties

10-A scientist suggested a simplified way to represent the number of valence electrons around an element symbol (……)
11-The inert gas whose Lewis structure includes 2 electrons(……)
12- The smallest alkali metals in terms of atomic radius(……)
13-The most chemically active element of group 7A(……)

3-Choose the correct answer from the given answers

Attempts to classify the elements and the modern periodic table

1-In Moseley's table, each element increase than the previous in the same period by one….
1- Neutron b-Proton c-Energy level d. atomic mass

2-The group of alkaline earth metals is located in the…….. periodic table
a. Left b. Right c. middle d. below

3-The number of elements of P block in each period of the periodic table is equal to……. Except for period 1
a. 2 b. 6 c. 10 d. 16

4-The block …… contains most types of elements
a. S b. P c. D d. F

5-The zero group of the modern periodic table belongs to the…….. block
a. S b. P c. D d. F

6-The zero groups includes……
a. Metals b. Liquid Non-metals c. metalloids d. inert gases

7-From Non-metals element ……
a. Magnesium b. Sodium c. Stratchium d. bromine

8-…….. is considered a solid halogen
a. Fluorine b. chlorine c. bromine d. iodine

9-The opposite figure: shows a section of the periodic table
Which of the following is true

Al	Si	P	S
Ga	Ge	As	Kr

a. Al: metal, Si: non-metal b. P: metal, Kr : semi-metal
c. Ga: metal, Ge: semi-metal d. As: metal, S metals

10-The period includes 4 elements of the block
a. s.p b. s.p.d c. s.f.d d.s.p.d.f

Periodic table, electronic distribution of elements and their properties

11-The elements of d-block are known as…….
a. Inert gas b. Transition elements
c. Alkali metals d. alkali earth metals

12-The element whose energy level M in its atom contains 2 electrons is located in ..... in the modern periodic table

a. Period 3 and Group 3A b. Period 3 and Group 2A
c. Period 2 and Group 4A d. Period 2 and Group 2A

13-Which of the following pairs of elements are in the same period of the modern periodic table

a. $_{10}Ne$, $_{11}Na$ b. $_{17}Cl$, $_{11}Na$ c. $_{3}Li$, $_{2}He$ d. $_{10}Ne$, $_{18}Ar$

14-The atomic number of the inert gas located in period 2 is…….

a. 2 b. 8 c. 10 d. 18

15-An alkali element is located in period 2, so its atomic number is equal to…….

a. 9 b. 7 c. 5 d. 3

16-If the last energy level of halogen element is the level, L then its atomic number is

a. 7 b. 9 c. 17 d. 19

17-An element located in period 3 and group 3, and the number of neutrons in the nucleus of its atom is equal to 14, so its mass number is…..

a. 30 b. 27 c. 24 d. 20

18-The Lewis structure includes two single electrons in an atom of ……

a. $_{6}C$ b. $_{7}N$ c. $_{15}P$ d. $_{16}S$

19-Which of the following represents the Lewis structure of the nitrogen atom $_{7}N$

20-Which of the following pairs of elements is monovalent

a. $_{9}F$, $_{11}Na$ b. $_{15}P$, $_{7}N$ c. $_{11}Na$, $_{15}P$ d. $_{9}F$, $_{7}N$

21-Iodine valency…..

a. trivalent b. divalent c. monovalent d. zero

22-Argon valency……

a. 0 b. 1 c. 6 d. 8

23-The first four elements in group 4A have the same

a. Number of electrons in the first and last energy levels b. Atomic radius
c. Number of energy levels d. Melting and boiling points

24-The smallest element in terms of atomic radius of the following elements is ……

a. $_{16}Cl$ b. $_{53}I$ c. $_{9}F$ d. $_{35}Br$

25-The largest element in the radius of a single vertical group is the element that has…..

a. The least number of neutrons in its atom nucleus
b. The least number of protons in its atom nucleus
c. The least number of nucleons in its atom nucleus
d. The largest number of electrons revolve around its atom nucleus

26-What is the change that occurs in alkali metals with increasing atomic number

a. Its physical state changes b. Their melting points decrease
c. Its radius decreases d. Its boiling point increases

27-Which of the following represents the element $_3X^7$

a. The nucleus of its atom contains 4 protons
b. gaseous element at west temperature
c.It is located in group 3A of the periodic table
d. It is located in period 2 of the periodic table

28-The vertical group in the modern periodic table that includes the most active metals is…

a. Halogen group b. Alkali group c. Group 7A d. Zero group

29-The most active halogen element has an atomic number of

a. 19 b. 35 c. 17 d. 9

3- Put (√) or (X)

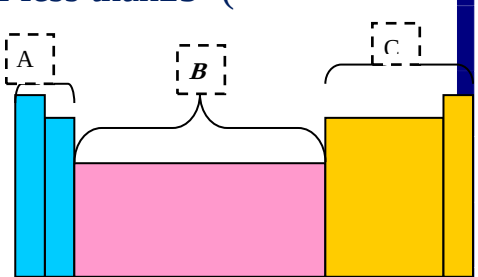
Attempts to classify the elements and the modern periodic table

1-Mendeleev added to his table the zero group, which includes the inert gases
2-The modern periodic table consists of 9 horizontal periods and 13 vertical groups ( )
3-Argon and helium agree in being active gases ( )
4-The modern periodic table contains 11 elements in the gaseous state( )
5-The block P consists of 5 vertical groups in the modern periodic table ( )
6-The block d contains most types of elements. ( )

The periodic table, the electronic configuration of the elements and their properties

7-The position of an element in the periodic table can be determined by knowing its mass number ( )
8-Elements of the same period have similar chemical properties ( )
9-An element located in period 1 and group zero has an atomic number 1( )
10-The element in period 2 and group 16 is a metallic element with a divalent valence ( ) ( )
11- The elements $_4X$, $_{12}Y$, $_{20}Z$ are in one period and three consecutive groups
12-The valence of the elements of group 4 A is equal to the group number( )
13- Both alkali elements and halogens are monovalent ( )
14-The atomic radius increases in a group with an increase in the atomic number. ( )
15- Chlorine is a gaseous element with a boiling point of less than25º (

4-This represent a part of the modern periodic table



A) What are names of blocks A, B and C
B) What is the number of group each block?
C) What is the new number of 7A group

5- using the following diagram answer the following questions

$_1$H																	$_2$He
3	A											5	6	Y	8	9	10
11	12														R	17	B
19	C					S											$_{36}$Kr

-Write letters of elements which

1- is among transition elements ( ) 2-lies in period 3 and group 6A ( )

3-is among noble gases ( ) 4-is consider among s-block ( )

5- is consider among p-block ( ) 6 -lies in period 4 and group 2A ( )

6.Choose from column (B) what suits it in column (A) .

(A)	(B)
1. Mendeleev	a. added the zero group to the periodic table
2. Rutherford	b. discovered the main energy levels of the atom
3. Moseley	c. corrected the atomic weights of some elements that were estimated wrongly
4. Bohr	d. discovered that the nucleus of the atom contains protons

7.:What is the atomic number of each of the following elements

1-An element that is located in period 2, group 6A

2-An element that is located in period 3, group zero

3-An element that is located in period 1, group zero

4-An element that is located in period 3, group 4A

5-An element that is located at the end of period 2

6-An element that is located at the beginning of period 4

7-The monovalent metal located in period 4

8-The trivalent nonmetal located in period 3

9-The element located in period 3 in the first group of the (p)-block groups

10-The alkaline earth metal which is located in period 4

Lesson (3) Pure substances and mixtures

المواد النقية والمخاليط

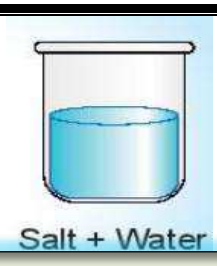
Substances can be separated by physical methods

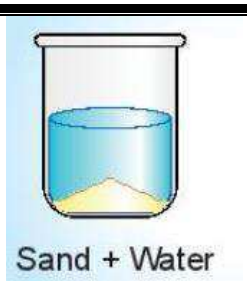
Pure substances		Mixtures	
Elements	compounds	homogenous mixtures (Solutions)	heterogeneous mixtures

1) Mixtures

e substances of two or more materials its components can be separated by physical methods المخاليط هي مواد مكونة من مادتين أو أكثر ويمكن فصل مكوناتها بالطرق الفيزيائية

homogenous mixtures (Solutions)	heterogeneous mixtures
are mixtures its components can't be distinguish by naked eye هى مخاليط لا يمكن التفرقة بين مكوناتها بالعين المجردة.	are mixtures its components can be distinguish by naked eye. هى مخاليط يمكن التفرقة بين مكوناتها بالعين المجردة
Table salt in water or sugar in water	sand in water or coffee in water





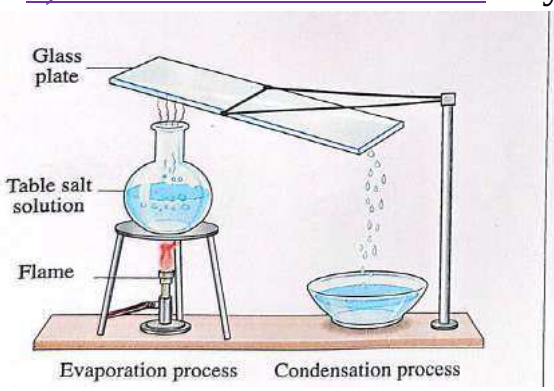
How can you separate the following mixtures?

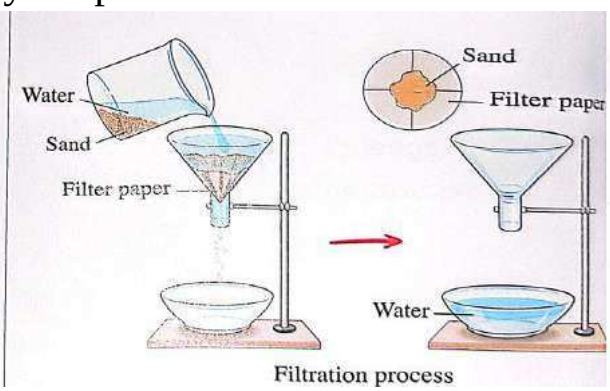
*The components of a mixtures can be separated by physical methods

As :- filtration , evaporation , condensation and magnetic attraction

1) A mixture of sand and water* By filtration الترشيح

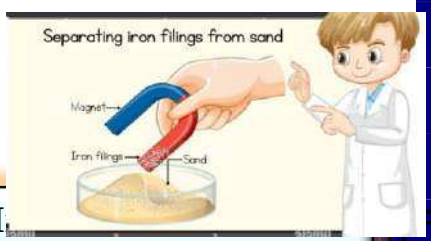
2) A mixture of salt and water* By evaporation التبخير then condensation التكثيف





3) A mixture of salt and iron fillings مخلوط ملح وبرادة حديد

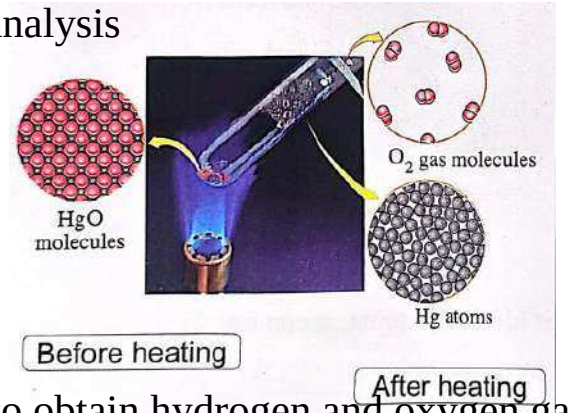
* By using magnet استخدام المغناطيس



How can you separate the components of compounds?

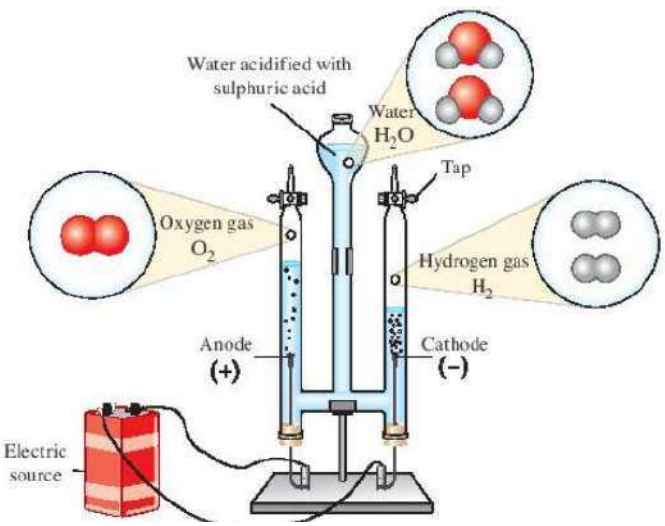
*The components of a compound can be separated by chemical methods
As :- heating and electrolysis electric analysis
تحليل كهربى

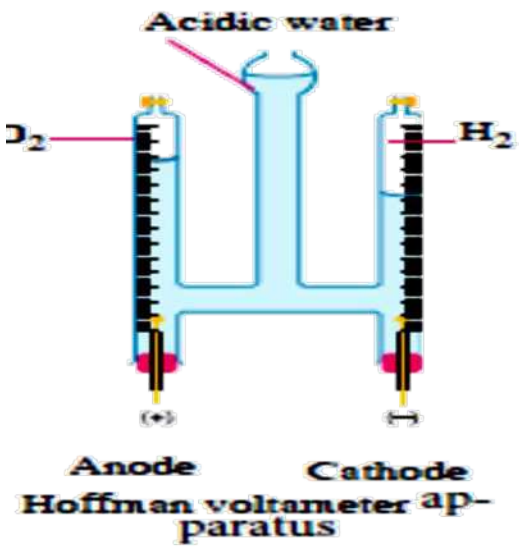
* Ex :- Heating mercuric oxide to produce oxygen and mercury



1) Hoffman voltmeter

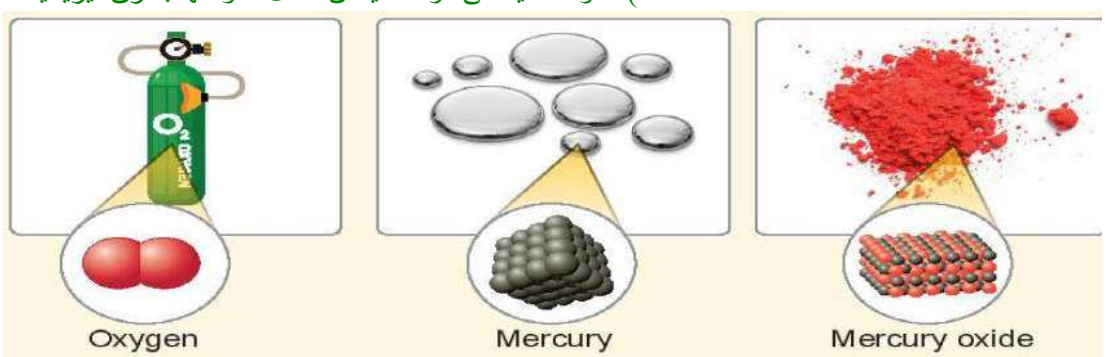
* Hoffman voltmeter is a device used to obtain hydrogen and oxygen gas by electric analysis of acidified water by sulphuric acid
* يستخدم جهاز فولتامتر هوفمان فى الحصول على غازى الأكسجين و الهيدروجين بالتليل الكهربى للماء المحمض بحمض الكبريتيك
*It is the analyzing vessel , it contains an electrolyte & 2 electrodes one positive called (Anode +) & the other negative called(cathode -).
*Water is a compound but oxygen and hydrogen are elements





Pure substances

are substances its components can't be separated by physical methods.
(المواد النقية هى مواد لا يمكن فصل مكوناتها بطرق فيزيائية



Pure substance may be compounds or elements

5) Compounds are pure substance its components can be separated by chemical methods.المواد النقية هى مواد لا يمكن فصل مكوناتها بطرق فيزيائية

6) Elements are pure substance its components can't be separated by chemical methods.

Compare between mixture and compound ?

Mixture	Compound
A mixture is a matter formed of two or more materials الخليط هو مادة مكونة من مادتين أو أكثر	A compound is a matter formed of two or more materials المركب هو مادة مكونة من مادتين أو أكثر
All materials that form mixture don't combine chemically. لا تتحد كيميائيا	All materials that form compound combine chemically تتحد كيميائيا
Mixing materials in a mixture doesn't change them into new substances خلط المواد في خليط لا يحولها إلى مواد جديدة	Mixing materials in a compound change them into new substances خلط المواد في مركب يحولها إلى مواد جديدة

Give reasons for:-

1)Oxygen and hydrogen are elements?

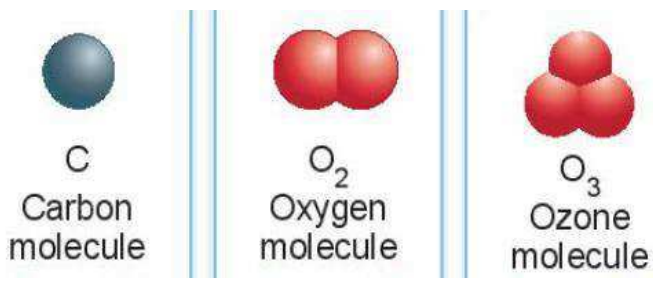
* Because theycan't be analyzed by similar forms physical or chemical methods.

2) Water is a compound?

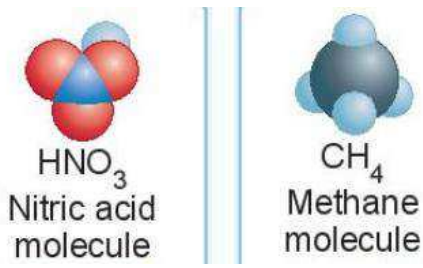
* Because we can separate water into oxygen and hydrogen by electric analysis

1)Molecules of elements can be monoatomic as carbon (C) , diatomic as oxygen (O_2) or triatomic as ozone (O_3)

Molecules of compounds can be



Organic molecules جزيئات عضوية	Inorganic molecule جزيئات غير عضوية
as Methane (CH_4)	as nitric acid (HNO_3)
CH_4 :- consists of 5 atoms for 2 elements	HNO_3 :- consists of 5 atoms for 3 elements



3) Chemical compound expressed by short molecular formula which is a symbolic formula show the type and number of atoms forming it as Methane (CH_4) or nitric acid (HNO_3)

3)يعبر عن المركب الكيميائى بصيغة مختصرة تعرف بالصيغة الجزيئية و وهى صيغة رمزية تعبر عن نوع و عدد ذرات العناصر المكونة للجزىء مثل (HNO_3) و (CH_4)

Number of atoms in one molecule of organic compound may reach thousands of atoms as plastic polymers , blood hemoglobin and vitamin (D)

قد يصل عدد الذرات في الجزيء الواحد من المركبات العضوية إلى آلاف الذرات كما في البوليمرات البلاستيكية والهيموجلوبين في الدم وفيتامين (د)

-Vitamin (D)control calcium and phosphorus level in blood to protect from osteoporosis.

فيتامين (د) يعمل على ضبط مستويات الكالسيوم و الفوسفور فى الدم للوقاية من مرض الهشاشة

G.R.Organic compounds Known as carbon compounds or hydrocarbons ,?

*Because carbon element is the main component combine with hydrogen and may with another atoms as Oxygen and Nitrogen.

لماذا تعرف المركبات العضوية بأسم مركبات الكربون أو الهيدروكربونات ، ؟
لأنها تتكون من عنصر الكربون مرتبط أساسا بذرات الهيدروجين يرتبط بذرات أخرى مثل الأكسجين و النيتروجين

Indigo blue dye صبغة الأزرق النيلى **Chemical name:** Indigotin ($CaCuSi_4O_{10}$)

***The ancient Egyptians** use Indigo blue dye in coloring statues and papyrus

* People in Nuba villages still use Indigo blue dye in coloring their houses.

Figure (13)
Egyptian blue dye

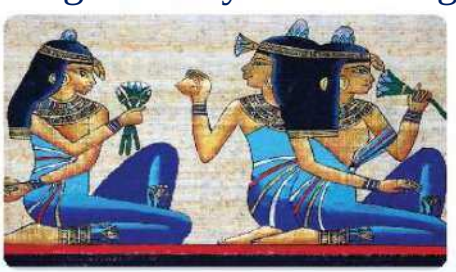


Figure (14)
Ancient Egyptian papyrus

Differentiate between different matters acording to their properties

التفرقة بين المواد المختلفة على حسب خواصها

1) We can differentiate between different matters by observing their chemical and physical properties الصفات الكيميائية و الفيزيائية

The physical properties	The chemical properties
can be observed and measure some of it	don't appear except when a chemical reaction happen

3) But n which leads to change in the shape and structure of matter

3) الخواص الكيميائية لا تظهر الآ عند حدوث تفاعل كيميائى يؤدى الى تغير فى شكل و تركيب المادة.

4) Examples for physical properties

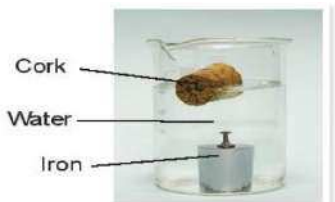
Viscosity لزوجة - density كثافة - melting point – boiling point– hardness Taste , color and smell- dissolving الذوبان– electric conductivity توصيل كهربى – heat conductivity التوصيل الحراري

a) Differentiate between Viscosity لزوجة of milk and water.

b) Differentiate between density كثافة of cork and iron

- Cork has less density than water so it floats تطفو –
- Iron has more density than water so it sink تغوص

c) The effect of heat on butter cup and aerogel sheet.



Viscosity اللزوجة :- is a physical property of some liquids , where it express the resistance of flowing or moving objects through it .

اللزوجة هى خاصية فيزيائية للسوائل تعبر عن مقاومة التدفق وحركة الأجسام خلال السوائل

5) Examples for chemical properties

a) The different color of litmus paper in lemon or in tooth paste اختلاف لون ورق عباد الشمس في الليمون أو في معجون الأسنان

Lemon is a substance that turns litmus paper leaves red, Toothpaste is a substance that turns litmus paper leaves blue.

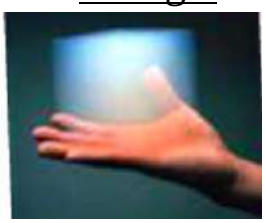
b)The different color of precipitate when you put the same indicator in different solutions.

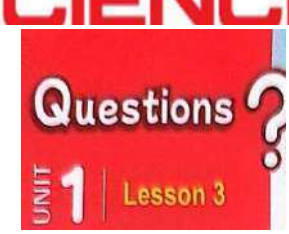
أختلاف لون الراسب الناتج عند أضافة كاشف واحد الى محلولين مختلفين

Two different solutions can be distinguished by adding a specific reagent to each of them, as one of them produces a precipitate of a different color.

يمكن التمييز بين محلين مختلفين عن طريق إضافة مادة كيميائية محددة لكل منهما، حيث ينتج عن أحدهما راسب بلون مختلف

Uses of substances according to their propertie استخدامات المواد حسب خواصها

Type of matter	Properties	Uses
Helium	A)Physical properties:- الخواص الفيزيائية is lighter than air. أخف من الهواء B) Chemical properties:- * Helium is safe to use because 1) It is not poisonous. غير سام 2)It is not flammable. غير قابل للأشتعال	1) It is used to fill balloons and blimps تستخدم لملىءالبالون و المنطاد
Nitrogen	A)Physical properties:- الخواص الفيزيائية 1) It is a Non-metal 2)doesn't affect by changing in temperature B) Chemical properties:- 1)don't react with rubber مطاط	* Used to fill car tires instead of air يستخدم فى ملىء أطار السيارات بدلا من الهواء
Silicon	A)Physical properties:- الخواص الفيزيائية 1) It is a metalloid شبة فلز 2) It conduct electricity better than nonmetals and less than metals إنه يوصل الكهرباء بشكل أفضل من اللافلزات وأقل من المعادن	* Silicon used to make electronic slides in computer يستخدم السيليكون فى صنع شرائح السيليكون فى الكمبيوتر
Stainless steel alloy	A)Physical properties:- الخواص الفيزيائية 1)made of iron with other elements B) Chemical properties:- Doesn't rust	Stainless steel alloy is used in 1) Cooking pots. أوانى الطهى
* Aluminum titanium alloy	A)Physical properties:- الخواص الفيزيائية 1) lighter than aluminum 2)keeps its hardness in the very high temperature	make the body of military planes تستخدم فى عمل أجسام الطائرات الحربية
Aerogel 	1)colorless transparent material with low density 1) مادة شفافة عديمة اللون وكثافتها منخفضة 2) air inter in its structure with ratio 99.8 % 2) 99.8 %يدخل الهواء في تركيبها بنسبة A)Physical properties:- الخواص الفيزيائية 1)The most lighter solid substance أخف مادة صلبة 2)very hard substance مادة صلبة جداً 3) has high ability to isolate temperature لها قدرة عالية على عزل الحرارة	* used to make coats for scientist who make researches Antarctica تستخدم فى عمل معاطف للعلماء الباحثين فى القارة الجنوبيه



Lesson three

1-Write the scientific term for each of the following

Classification of materials

(1) Substances composed of two or more substances that are not chemically combined and whose components can be separated by physical methods. ( )

(2) Mixtures whose components cannot be distinguished with the naked eye ( )

(3) Mixtures whose components can be distinguished with the naked eye. ( )

(4) Substances whose components cannot be separated by physical means. ( )

(5) The simplest pure form of matter cannot be analyzed into simpler one by physical or chemical methods. ( )

(6) A molecule composed of one type of identical atoms. ( )

(7) A pure substance formed by the chemical union of two or more elements in fixed mass proportions. ( )

(8) A molecule composed of different atoms of different elements.( )

(9) Compounds in which carbon atoms are linked to hydrogen atoms and may be linked to other atoms such as oxygen and nitrogen. ( )

(10) A symbolic formula that expresses the type and number of atoms of the elements that make up the molecule. ( )

(11) A dye used by the ancient Egyptians to color papyri and statues.( )

Distinguish between materials and their uses according to their properties

(12) Properties of matter that can be observed and some of them measured. ( )

(13) A physical property of fluids that expresses the extent of their resistance to flow and movement of objects through them. ( )

(14) A physical property used to distinguish between materials that float on the surface of water or sink in it. ( )

(15) The temperature at which a substance begins to change from a solid to a liquid state. ( )

(16) A transparent, low-density material that contains 99.8% air.( )

(17) Properties of matter that only appear when a chemical reaction occurs that leads to a change in the shape and composition of the matter. ( )

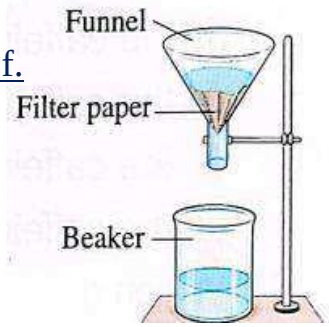
(18) An alloy lighter than aluminum alone that retains its strength at high temperatures. ( )

(19) A carrier gas with a density less than that of air, used to fill cylinders.

(20) A non-metallic gas that is not affected by temperature changes and does not react with rubber. It is used in filling car tires.

2-Choose the correct answer from the given answers:

Material classification



(1) The opposite figure: illustrates the process Separate a mixture of.

a. Salt and sand. b. Water and sand.

c. Oil and water. d. Water and sugar

(2) Sugar-water solution is a…… mixture.

a. Heterogeneous, its components can be distinguished.

b. Homogeneous, its components cannot be distinguished.

c. Homogeneous, whose components cannot be distinguished.

d. Heterogeneous, its components cannot be distinguished.

(3) When table salt and sand are mixed together in water, it forms...

a. Heterogeneous mixture b. Solution c. Homogeneous mixture d.. Compound

(4) All of the following describe the element except:

a. It cannot be analyzed into anything simpler. b.It is made up of different atoms

c. The simplest form in which matter exists. d. It may have more than one isotope

(5) All of the following can be separated by chemical means, except:

a. Water b. methane c. Mercury oxide. d. Magnesium

(6) The element whose molecule consists of two atoms is

a. Mercury oxide b. bromine c. Sodium chloride d. Sodium

(7) All of the following gas molecules are monatomic, except .

a. Helium molecule b. Argon molecule c. Oxygen molecule d. Neon molecule

8) All of the following molecules are composed of Of two elements, except:

a. Water b. Hydrogen chloride c. Oxygen d. Methane

(9) All of the following organic compound molecules consist of thousands of atoms, except

a. Vitamin D. b. Methane c. plastic polymer d. Hemoglobin

(10) Both the Methane molecule and the nitric acid molecule share the presence of atoms…… in each of them.

a. Nitrogen b. Hydrogen c. Oxygen d. Chlorine

(11) How many elements are included in the composition of magnesium carbonate $MgCO_3$?

a. 2 b. 3 c. 4 d. 4

(12) What are the elements and atoms that make up one molecule of methane, in order?

a. 2.4 b. 2.5 c. 3.5 d. 3.6

(13) The molecular formula of caffeine in coffee is $C_8H_{10}N_4O_2$ All of the following are true except

a. A caffeine molecule contains the elements carbon and nitrogen.

b. Caffeine is an inorganic compound

c. The caffeine molecule contains 4 nitrogen atoms

d.. The caffeine molecule is composed of 4 elements

(14) Which of the following is a compound? Dying the verses

a. Indigo stainless steel alloy. b. Aluminum-titanium alloy.

c. Stainless steel alloy d. Silicone

(15) How many non-metal atoms are there in one molecule of indigo blue dye ($CaCuS_{14}0_{10}$)?

a. 2 b. 11 c. 15 d. 24

The distinction between materials and their uses depends on their properties.

(16) Which of the following describes the process of melting ice?

a. It represents a chemical change. b. It represents a physical change.

c. It is done by turning water into ice d. It produces carbon dioxide gas.

(17) From the Chemical properties of iron.

a. Its density is greater than that of water. b. Good conductor of electricity.

c. Reacts with sulfuric acid. d. The magma temperature is high.

(18) Balloons can be filled with gas.

a. Oxygen b. Nitrogen c. Chlorine d. Helium

(19) The alloy used in the manufacture of military aircraft structures is a homogeneous mixture of two elements.

a. Iron and aluminum. b. Titanium and cobalt

c. Iron and carbon d. Aluminum and Titanium

3-Choose from column (B) what suits it from column (A):

(A)	(B)
(1) CH_4	(1) Organic ionic compound.
(2) CaO	(2) Reacts with caustic soda solution.
(3) HCI	(3) Ionic compound its molten is a good electrical conductor.
	(4) Organic covalent compound

4-Complete the following table:

	molecule	molecular formula	Molecule type	Number of element that make it	Number of atom make it
(1)	ozone molecule	……	……	……	……
(2)	lead bromide	$PbBr_2$	……	……	……
(3)	Ammonium chlori	NH_4 CI	……	……	……
(4)	Aluminium oxide	Al_2O_3	……	……	……

5-correct what is underlined:

Classification of materials

(1) Pure substances are divided into solutions and compounds.

(2) The oxygen molecule consider as a solid, monatomic non-metal.

(3) Water molecules can be separated by heating.

(4) Vitamin A regulates the levels of calcium and phosphorus in the blood.

(5) Carbon dioxide is an organic compound.

(6) The molecular formula of nitric acid is HNO_2.

(7) The number of metal atoms in one molecule of indigo dye is 3.

Distinguish between materials and their uses according to their properties

(8) The viscosity of honey is equal to that of water.

(9) Helium gas is used to fill car tires.

(10) It is preferable to make cooking utensils from iron because it does not rust.

6-Put (√) and (X), and correct the wrong :

Classification of materials

(1) The components of mixtures can be separated by chemical methods.( )

(2) The sand-water mixture can be separated by the method of sleep separation ( )

(3) When water is electrolyzed, compound molecules are produced. .( )

(4) Vitamin C helps prevent osteoporosis. ( )

(5) The molecular formula ($CaCuS_{14}O_{10}$) represents a red dye. ( )

Distinguish between materials and their uses according to their properties

(8) The chemical properties of matter can be directly observed and some of them can be measured. ( )

(7) The viscosity of water is less than that of honey, so it is difficult to stir water from honey. ( )

(8) The density of cork is less than the density of water, so it floats on its surface( )

(9) A slab of butter can be distinguished from a slab of aerogel by their melting point ( )

(10) Aerogel is characterized by its high density. ( )

(11) Nitrogen gas is not affected by high temperatures. ( )

(12) Distinguishing between two different solutions by adding a specific reagent to each of them, after a physical change. ( )

(13) Lemon and toothpaste can be distinguished using two sunflower leaves.

7-Give one example of each:

(1) Homogeneous mixture. (2) Heterogeneous mixture.

3) A solid, monatomic, non-metallic element.

(4) A polyatomic element molecule. (5) Organic compound particle

(6) Particle, inorganic compound (7) Physical separation methods

(8) Chemical separation methods.

8-Give reason:

Classification of materials

(1) A solution of table salt is a homogeneous mixture, while a mixture of sand in water is a heterogeneous mixture.

……..

(2) Both hydrogen gas and nitric acid are pure substances.

……..

(3) A water molecule is a compound molecule, while an oxygen molecule is an element molecule.

……..

(4) Methane molecule is an organic compound molecule.

……..

(5) Organic compounds are known as carbon compounds.

……..

The distinction between materials and their uses depends on their properties.

(6) Viscosity is a physical property.

……..

(7) It is easier to stir water than honey.

……..

(8) Cork floats on the surface of the water, while iron sinks under the surface of the water.

……..

(9) Aerogel is used to make jackets for research scientists in cold regions.

……..

(10) The flammability of a substance is a chemical property.

……..

(11) Helium gas is used to fill balloons.

……..

12) Nitrogen is used to fill car tires instead of air.

……..

(13) Aluminum and titanium alloys are used in the manufacture of military aircraft structures.

……..

(14) Stainless steel alloy is used in the manufacture of utensils.

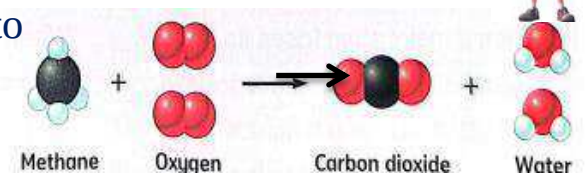
……..

Lesson (4) Chemical bonds

الروابط الكيميائية

1)The reaction of Methane with oxygen to produce carbon dioxide and water vapor.

$CH_4 + 2\ O_2 \qquad CO_2 + 2H_2O$



The element 3 types(Noble Gases -metals- nonmetals)

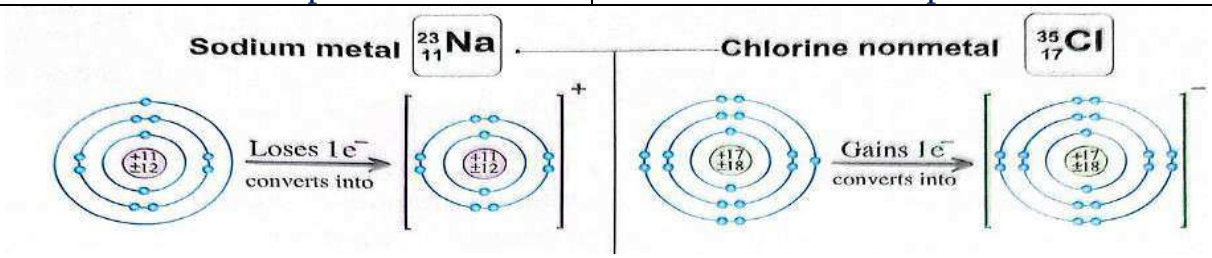
1-Noble Gases

From the Lewis structure of the following noble gases

- The outermost energy level is complete with 8 electrons, except helium, which complete with 2 electrons.

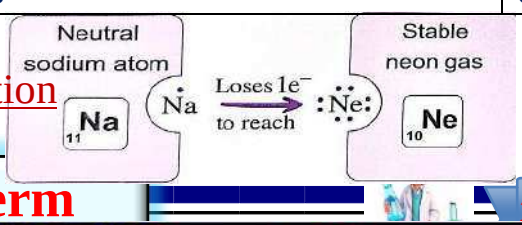
They are stable elements. And as a result, their atoms do not bond- under normal conditions with each other or with other elements

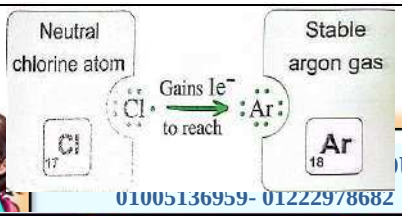
2-The metals	3-The nonmetals
Metal atoms tend to lose their valence electrons to reach the stable electron configuration of the noble gas with the closest atomic number that precedes them in the periodic table	Nonmetal atoms tend to gain one or more electrons according to their valences to reach the stable electron configuration of the noble gas with the closest atomic number that follows there in the periodic table



When a metal atom loses its valence electrons, it converts into a positive ion (cation) carrying a number of positive charges equal to the number of the lost electrons	When a nonmetal atom gains electrons, it converts into a negative ion (anion) carrying a number of negative charges equal to the number of the gained electrons
The Positive ion (Cation) It's a metal atom that has lost one or more electrons	The Negative ion (Anion) It's a nonmetal atom that has gained one or more electrons

Explanation





01005136959- 01222978682
D.M.RAZK
موقع الدكتور محمد رزق معلم الكيمياء التعليمي

1) Metals			(+)positive ion
$_{11}Na$	⟹	lose 1 e	Na^{+}
$_{12}Mg$	⟹	lose 2 e	Mg^{+2}
$_{13}Al$	⟹	lose 3 e	Al^{+3}

NB The electronic configuration of (Na^{+}) (Mg^{+2}) (Al^{+3}) ions is similar to the electronic configuration of neon ($_{10}Ne$)

2) Non-metals			(-)negative ion
$_{151}P$	⟹	gains 3 e	P^{-3}
$_{16}S$	⟹	gains 2 e	S^{-2}
$_{17}Cl$	⟹	gains 3e	Cl^{-3}

NB The electronic configuration of (P^{-3}) (S^{-2}) (Cl^{-1}) ions is similar to the electronic configuration of neon ($_{18}Ar$)

1) Compare between the atom and the ion?

The atom	The ion
1) Electrically neutral متعادلة كهربيا	1) Charged (negative or positive) مشحونة موجبة أو سالبة
2) The number of electrons = number of protons	2) The number of electrons is more than or less than that of protons.

Comparison between metals and non-metals:

Metals	Non-metals
They have less than (4) electrons in the outermost energy level.	They have more than (4) electrons and less than 8 in the outermost energy level.
They are solids (except mercury (Hg) which is a liquid).	They are solids and gases (except bromine (Br) which is a liquid).
They have metallic luster.	They have no luster.
They are malleable and ductile.	They are not malleable or ductile.
They are good conductors of heat and electricity.	They are bad conductors of heat and electricity. (Except graphite (carbon) that is a good conductor of electricity).

Mr: Alifa
01005136959- 01222978682
D.M.RAZK موقع الدكتور محمد رزق معلم الكيمياء التعليمي

Comparison between positive ion and negative ion:

Positive ion (cation)	Negative ion (anion)
Metallic element that loses an electron or more during chemical reaction.	Non- metallic element that gains an electron or more during chemical reaction.
It carries positive charges equal to the number of the lost electrons.	It carries negative charges equal to the number of the gain electrons.
The number of its electrons is less than the number of protons inside the nucleus	The number of its electrons is more than the number of protons inside the nucleus.

Give reasons for :-

1)The atom of different inert gases is stable ?

* Because the outer most energy level is saturated with electrons 8 electrons except helium ($_2He$) saturated by 2 electrons

From the types of chemical bonds :- a)Ionic bonds b) Covalent bonds

من أنواع الروابط الكيميائية الرابطة الأيونية و الرابطة التساهمية

Ionic bond

First Ionic bond

*It Is the bond formed by electric attraction between positive ion and negative ion (Arises between metals & non metals).

1) How was the ionic bond formed?

1) Metal elements lose electrons & form positive ions

2) Nonmetal elements gain electrons & form negative ions.

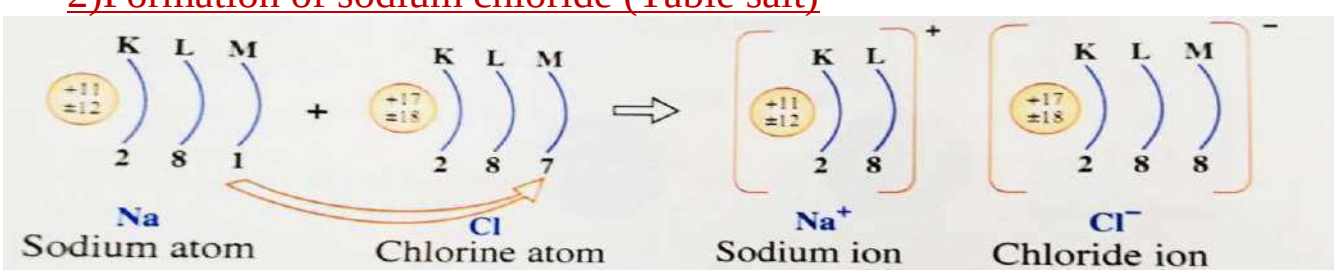
3)An electric attraction occurs between the positive and negative ions

3) يحدث جذب كهربى بين الأيون الموجب و الأيون السالب giving the ionic bond.

2)Examples of compounds formed by the ionic bond :-

Sodium chloride (NaCl) and magnesium oxide (MgO)

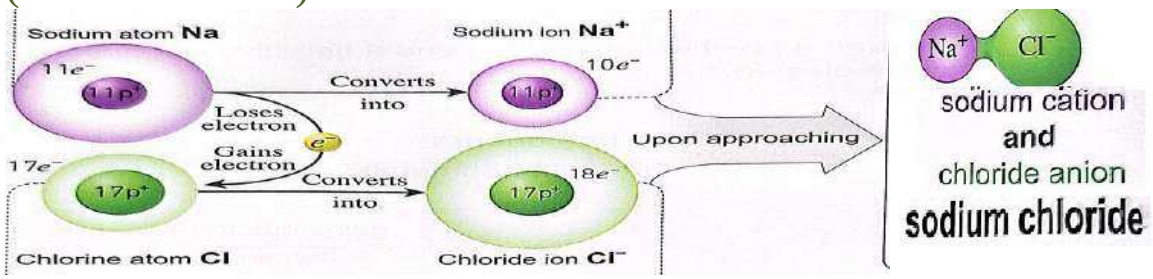
2)Formation of sodium chloride (Table salt)



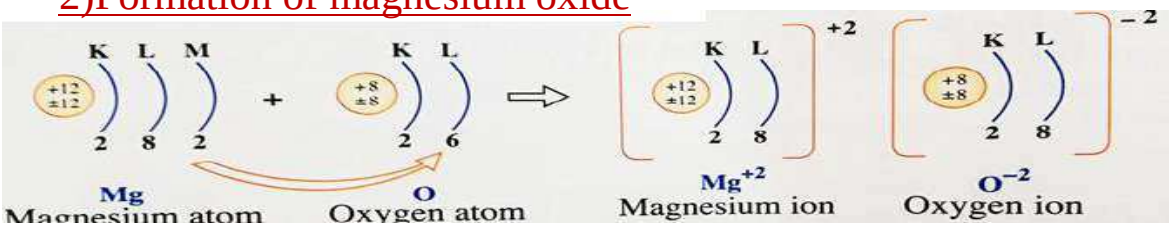
Mr: Alifaz.N. Tadrous
01005136959- 01222978682

D.M.RAZK موقع الدكتور محمد رزق معلم الكيمياء التعليمي

sodium ion Na^+ and chloride ion Cl^- forming an ionic molecule Na Cl (sodium chloride)



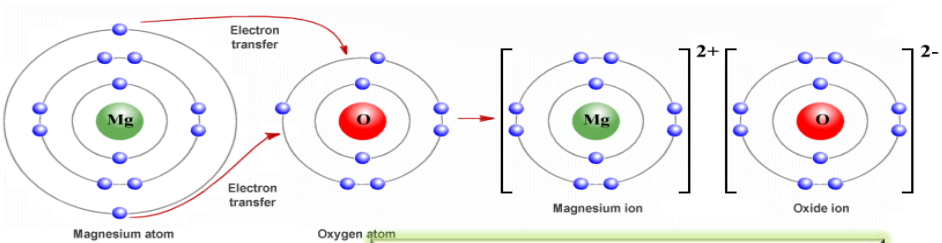
2)Formation of magnesium oxide



Magnesium ion Mg^{++} and negative Oxygen ion O^{--} forming an ionic molecule Mg O (Magnesium Oxide)

Mg^{++} + O^{--} → (Electronic attraction) $Mg^{++}\ O^{--}$

Positive Magnesium ion — negative Oxygen ion — (Magnesium Oxide) Mg O



Second Covalent bond

Covalent bond sulted between atoms of non-metals by sharing a number of electrons equal to the number of electrons that complete the outer electron shell (energy level).

الرابطة التساهمية تنشاء من مشاركة الألكترونات بين اللأفلزات (تشارك بعدد الكترونات تساوى عدد الألكترونات التى تكمل مستوى الطاقة الخارجى بالألكترونات)

The types of covalent bond

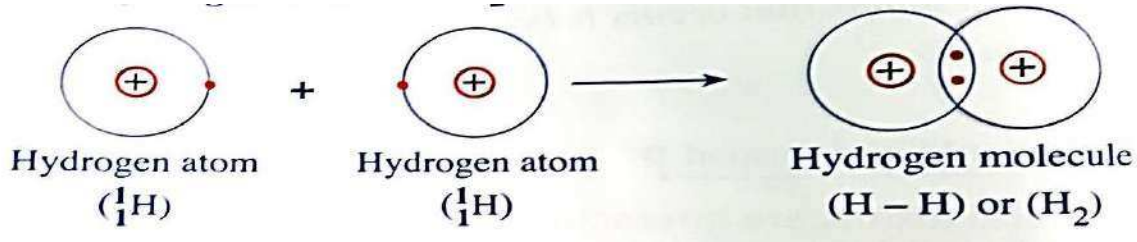
1) Single covalent bond :- رابطة تساهمية أحادية

* It is the bond which arises between 2 non- metals by sharing with one pair of electrons (Each atom Shares the other atom with one electron)
And the pair of electron revolve around the 2 atoms

It is represented by one line (-) joining the two atoms

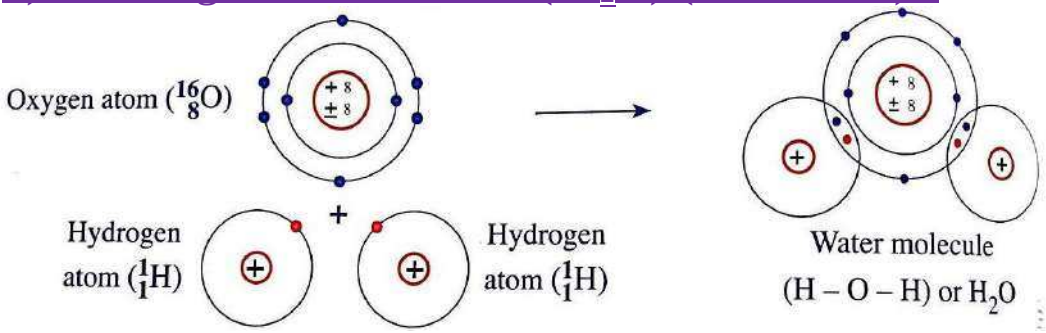
*Example:- hydrogen (H –H) – water (H- O – H)

1) Forming Hydrogen molecule (H_2) (H – H):-



Chlorine (Cl –Cl) – hydrogen chloride (H –Cl)

2) Forming Water molecule(H_2O) (H – O – H):-

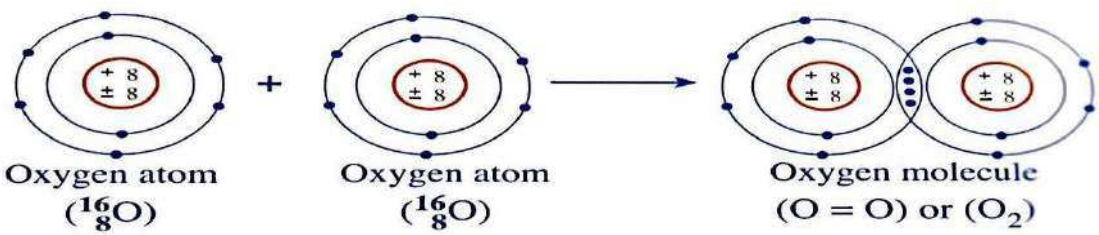


It is represented by one line (-) joining the two atoms.

2) Double covalent bond:- رابطة تساهمية ثنائية

* It is the bond which arises between 2 non- metals by sharing with two pairs of electrons (Each atom Shares the other atom with two electron).

Example Forming oxygen molecule (O_2) (O= O):-



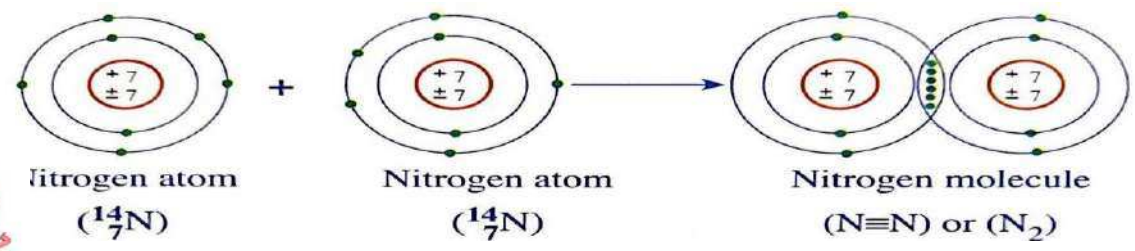
oxygen molecule O_2 It is represented by two lines (=) joining the two atoms

3) Triple covalent bond:- رابطة تساهمية ثلاثية

* It is the bond which arises between 2 non- metals by sharing with three pairs of electrons (Each atom Shares the other atom with Three electron)

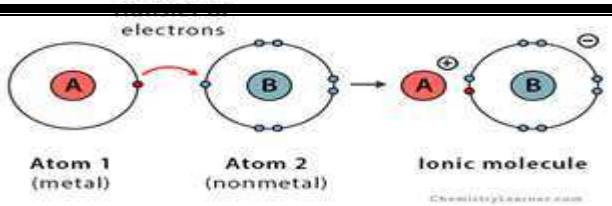
Example Forming Nitrogen molecule (N_2) (N≡ N)

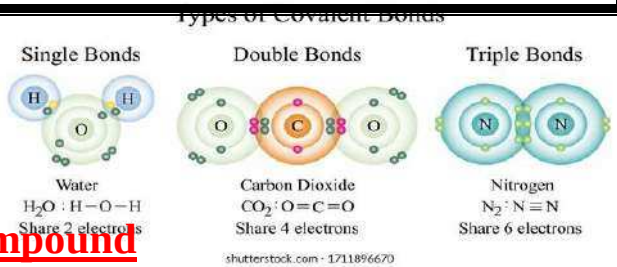
Nitrogen molecule N_2 It is represented by three lines (≡) joining the two atoms



Comparison between ionic bond and Covalent bond:

Ionic bond	Covalent bond
between metal and non-metal elements	between two non-metal elements.
It is formed by losing and gaining of electrons.	It is formed by sharing of one pair of electrons or more.
It is formed between 2 atoms of two different elements.	It is formed between 2 atoms of two same or different elements
one type.	three types (single, double and triple).
It produces compound molecules only.	It produces element and compound molecules.





The properties of ionic and covalent compound

1) Most of ionic compounds:- معظم المركبات الأيونية

a) Dissolve in water تذوب فى الماء

b) Its solutions and molten conduct electric current محاليلها ومصهورتها توصل التيار الكهربى

c) Have high melting and boiling point درجة أنصهار و غليان مرتفعة

2) Most covalent compounds:- معظم المركبات التساهمية

a) don't dissolve in water b) don't conduct electric current

c)have low melting and boiling point درجة أنصهار و غليان منخفضة

the unique properties of carbon atom that make it essential elements in organic compound?

الخواص الفريدة لذرة الكربون والتى تجعلها عنصر أساسى للمركبات العضوية؟

1) The outer most energy level of 6C contains four (4) single electrons.

2) Carbon atom can connect with each other in the organic compounds in the form of straight series , branched series or cycle series

2) تتصل ذرات الكربون مع بعضها فى المركبات العضوية فى صورة سلاسل مستقيمة او سلاسل متفرعة أو سلاسل حلقية

Cycle series	branched series	straight series

3)Methane considered the simplest form of organic compounds. (CH_4)

3) الميثان يعتبر ابسط جزىء للمركبات العضوية

Give reasons for:-

1) When an atom gives an electron or more it become a positive ion?

*Because the number of electrons becomes less than the number of protons.

عندما تفقد الذرة الكترون أو أكثر تصبح ايون موجب؟ لآن عدد الألكترونات تصبح أقل من عدد البروتونات.

2) When an atom gains an electron or more it become a negative ion?

*Because the number of electrons becomes more than the number of protons.

(عندما تكتسب الذرة الكترون أو أكثر تصبح ايون سالب؟ لآن عدد الألكترونات تصبح أكثر من عدد البروتونات.

3) The bond of an oxygen molecule is a double covalent bond?

* Because each oxygen atom shares with 2 electrons to form double covalent bond

4) Nobel gases don't participate in the chemical reactions under the ordinary conditions? *Because its outer energy level full of electrons.

)الغازات الخاملة لا تشارك فى التفاعلات الكيميائية تحت الظروف العادية؟ * لأن مستوى الطاقة الخارجى ملىء بالألكترونات.

5) Sodium atom tends to form a positive ion , while oxygen atom tends to form a negative ion?

*Because sodium lose one electron and becomes a positive ion
While oxygen gains 2 electrons an form a negative ions.

6) Ionic bonds produce only compounds only not elements but the covalent bond produce both type an element and compound?

* Because ionic bond produced 2 different atoms metals and non metals
But covalent bond produced between 2 similar or different non metals.

7) The bond in molecule of magnesium oxide (MgO) is an ionic bond?

*Because magnesium has 2 electrons in its outer energy level so it lose that electrons and becomes a positive ion.
While oxygen atom has 6 electrons in its outer energy level so it gains that 2 electrons an form a negative ions.

8) Sodium can't make a bond with magnesium ?

* Because both of them form positive ions only

Lesson Four

1-Write the scientific term for each of the following

From the beginning of the lesson until the end of ionic bonding

(1) Elements that are stable due to that their outermost energy levels are completely filled with electrons. (…….)

(2) Elements whose atoms tend to lose their valence electrons to reach the stable electron configuration of the nearest noble gas(…….).

(3) A metal atom that has lost one or more electrons(…….).

(4) A nonmetal atom that has gained one or more electrons(…….).

(5) Electrostatic attraction between a positive ion (cation) and a negative ion (anion) (…….).

(6) The compound which is formed as a result of the electrostatic attraction between a cation and an anion(…….).

(7) The chemical bonding that arises between a metal atom and another nonmetal atom(…….).

(8) Compounds whose both aqueous solutions (their solutions in water) and moltens can conduct electricity(…….).

(9) The bonding that arises between two atoms of the same nonmetal element or two atoms of different nonmetal elements by sharing electrons between them. (…….)

(10) The bond which is formed of a pair of electrons in which each atom shares its single (unpaired) valence electron(…….).

(11) The bond which is formed of two pairs of electrons in which each atom shares its two unpaired valence electrons(…….).

(12) The bond which is formed of three pairs of electrons in which each atom shares its three unpaired valence electrons (…….).

(13) Compounds, most of them do not dissolve in water and have low melting and boiling points. (…….)

2-Choose the correct answer:

From the beginning of the lesson until the end of lonic banding

(1) All the following atoms can form ions, except

a. $_{17}CI$ b.$_{13}Al$ c. $_{18}Ar$ d.$_{12}Mg$

(2) Noble gas molecule consists of

a. one atom b. two different atoms.

c. two similar atoms d. three atoms.

(3) The electron configuration of the ion of potassium element K is similar to the electron configuration of the ion of

a. $_{8}O$ b.$_{11}Na$ c. $_{18}Ar$ d. $_{17}Cl$

(4) The number of electrons in the following ions equals that in sodium ion, except the ion of

a. $_{13}Al$ b. $_{17}Cl$ c. $_{12}Mg$ d. $_{8}O$

(5) The number of energy levels in lithium ion is……. the number of energy levels in lithium atom

a. less than b. greater than c. equal to

(6) The ion of sulphur atom $_{16}S^{32}$ contains

a.18 protons, 16 electrons b.14 protons, 16 electrons.

c. 16 protons, 16 electrons d. 16 protons, 18 electrons.

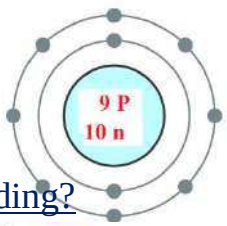
(7) The number of ..... in the chloride ion is greater than in the chlorine atom

a. protons b. neutrons c. energy levels d. electrons

(8) Which of the following ions gained the least number of electrons ?

a. $_{17}Cl^{-}$ b. $_{20}Ca^{2+}$ c. $_{13}Al^{3+}$ d. $_{15}P^{3-}$

(9) The opposite figure represents



a. sodium ion b. fluoride ion.

c. sodium atom d) fluorine atom.

(10) Which of the following represents ionic bonding?

ⓐ $[Na]^{+}[Cl]^{-}$ ⓑ $H:S:H$ ⓒ $[Li]^{+}[:F:]^{-}$ ⓓ $H:Cl:$

(11) Which of the following pairs of elements are bonded together through lonic bonding ?

ⓐ $\cdot X:, :Y\cdot$ ⓑ $:X:, Y\cdot$ ⓒ $\cdot X:, Y\cdot$ ⓓ $\cdot X\cdot, Y\cdot$

(12) Ionic bonding arises between calcium element $_{20}Ca$ and element

a. $_{4}Be$ b. $_{8}O$ c. $_{12}Mg$ d. $_{19}K$

(13) Which of the following elements cannot be binded with chlorine under normal conditions?

a. Hydrogen b. Helium c. Magnesium d. Sodium.

(15) Covalent bonding arises between

a. metal and metal b. metal and nonmetal..

c. nonmetal and nonmetal d. nonmetal and noble gas.

(16) The bond in hydrogen molecule is

a. Ionic b. single covalent c. double covalent. d. triple covalent

(17) The bonds in water molecule are

a. single covalent b. double covalent. c. triple covalent d. Ionic

(18) A single covalent bond is formed in the molecule of

a. oxygen b .chlorine c. nitrogen d. helium

(19) Which of the following represents the bonding in oxygen molecule by the Lewis method

ⓐ $:O=O:$ ⓑ $O\equiv O$ ⓒ $O=O$ ⓓ $:O-O:$

(20) in oxygen molecule each atom shares ……electrons

a. 1 b.2 c. 3 d. 4

(21) How many covalent bonding electrons are there in nitrogen molecule?

a. 2 electrons b. 3 electrons c. 6 electrons d. 14 electrons

(22) All the following describe the chlorine element $_{17}Cl$ except that

a. it is a diatomic molecule.

b. its atom forms a negatively charged ion.

c. it is less chemically active than bromine element.

d. it forms an ionic bond with potassium

(23) The opposite figure represents a compound that is

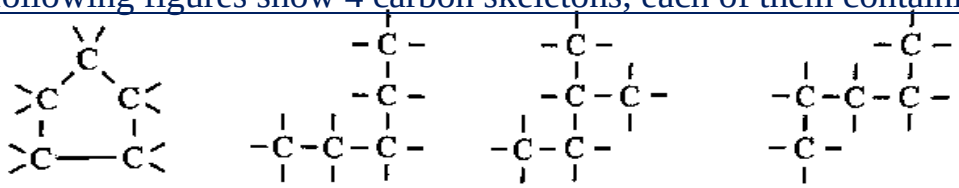
a. Ionic and dissolves in water b. covalent and has a high melting point.

c. Ionic and reacts with caustic soda d. covalent and reacts with caustic soda

(24) Which of these elements its atoms can be binded together in long chains?

a. Sodium b. Oxygen c. Sulphur d. Carbon

(25) The following figures show 4 carbon skeletons, each of them containing 5 carbon atoms:



How many of these carbon skeletons represent continuous chains?

a. 1 b.2 c. 3 d. 4

(26) The simplest chemical formula of the organic compound which is formed by the combination of carbon and hydrogen is

a. CH_2 b. CH_4 c. C_2H d. C_4H

3-Choose from column (B) what suits it from column (A):

(A)	(B)
(1) CH_4	(1) Organic ionic compound.
(2) CaO	(2) Reacts with caustic soda solution.
(3) HCl	(3) Ionic compound its molten is a good electrical conductor.
	(4) Organic covalent compound.

4-Choose from columns (B) and (C) what suit them from column (A):

(A)	(B)	
(1) $_{20}Ca$	(1) Inert gas	(1) Its atom becomes a positive ion with two positive charges.
(2) $_{2}He$	(2) Nonmetal	(2) Its atom becomes a negative ion with two negative charges.
(3) $_{16}S$	(3) Metal	(3) Its atom does not form positive or negative ions.
		(4) Its atom becomes a negative ion with one negative charge.

5-Complete the following sentences using the given words (or phrases):

(greater than - equal to - less than (Each word can be used more than once.)

(1) The number of electrons in the ion of $_8O$ is ……. the number of electrons in the ion of $_{13}Al$

(2) The number of positive charges carried by the ion of beryllium $_4Be$ is ……the number of positive charges carried by the ion of lithium $_3Li$

(3) The number of electrons in the ion of $_{4\backslash15}P$ is……. the number of protons in its atom.

(4) The number of energy levels in the ion of fluorine $_9F$ is ……the number of energy levels in its atom.

(5) in ionic bonding, the number of lost electrons is …….the number of gained electrons.

(6) The boiling point of methane is ……..the boiling point of sodium iodide.

6-Mark (√) or (x) for each statement, with correction:

From the beginning of the lesson until the end of lonic bonding

(1) The number of energy levels in the ion of chlorine $_{17}Cl$ is less than that in argon atom $_{18}Ar$ ( )

(2) To convert fluorine into a negative ion, It needs to lose a proton ( ).

(3) When an atom becomes an ion the number of nucleons changes while the number of electrons remains unchanged ( ).

(4) When magnesium oxide molecule is formed, oxygen atom loses 2 electrons and magnesium atom gains them ( )

(5) The ionic compound is electrically neutral.

(6) The molecular formula of the ionic compound formed by the combination of the alkaline earth metal (A) with element (B) from group 6A is AB ( )

From covalent bonding until the end of the lesson

(7) When two hydrogen atoms combine together to form a molecule, each atom shares a pair of electrons ( ).

(8) The H_2O molecule contains two single covalent bonds, which can be represented as follows: $H-H-\ddot{O}$ ( )

(9) The bonding in the SO, molecule is ionic bonding. ( )

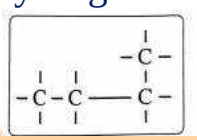
(10) The bond in oxygen molecule $O\equiv O$ consists of three pairs of electrons ( )

(11) Sodium chloride is a covalent compound that reacts with caustic soda solution. ( )

(12) Sulphur atoms have very unique properties because of their ability to bind to each other in organic compounds in various forms. ( )

(13) In methane molecule, carbon atom is binded to three hydrogen atoms ( ).

(14) The opposite figure represents a branched carbon chain consisting of 4 carbon atoms.



( )

7- Give one example for each of the following:

(1) An ionic molecule.
(2) A covalent molecule that includes a single covalent bond.
(3) A covalent molecule that includes a double covalent bond.
(4) A covalent molecule that includes a triple covalent bond.

8- What is meant by each of the following:

(1) Cation (positive ion). (2) Anion (negative ion).
(3) ionic bonding. (4) Covalent bonding.

9-Give reasons for each of the following:

From the beginning of the lesson until the end of lonic bonding

(1) The stability of the noble gas stoms according to their electron configuration.

…… ……

(2) Argon element cannot form a positive ion or a negative ion under normal conditions.

…… ……

(3) Nonmetal atoms tend to gain or share electrons to form chemical bonds.

…… ……

(4) Metal atoms tend to lose their valence electrons.

…… ……

(5) Aluminum atom forms a positive lon, while chlorine atom forms a negative ion.

…… ……

(6) A magnesium ion carries two positive charges.

…… ……

(7) A nonmetal atom converts into a negative ion when it gains one or more electrons.

…… ……

(8) Potassium element K tends to bind to chlorine element, Cl with an ionic bond.

…… ……

(9) The number of electrons in the ion of each of fluorine F and sodium Na in sodium fluoride molecule is equal.

…… ……

(10) The ionic compound is electrically neutral.

…… ……

(11) Sodium and magnesium cannol combine together to form a compound molecule.
From covalent bonding until they end of the lesson

…… ……

(12) Sodium chloride is an ionic compound, while hydrogen chloride is a covalent compound.

…… ……

(13) The bond in water molecule is single covalent bond.

…… ……

(14) The bond in nitrogen molecule N, is a triple covalent bond.

Unit (2) Force field

Lesson (1) Electric force

When the balance between positive and negative charges is disturbed, a form of electricity known as static electricity (electrostatic) is produced

عندما يختل التوازن بين الشحنات الموجبة والسالبة، يتم إنتاج شكل من أشكال الكهرباء المعروفة بالكهرباء الساكنة (الكهروستاتيكية)

Activity Concept of Static Electricity and Charging by Friction (Rubbing method)

The Steps

1-Rub one end of an ebonite rod with a piece of wool, then bring the rod close to small paper pieces (paper scraps)

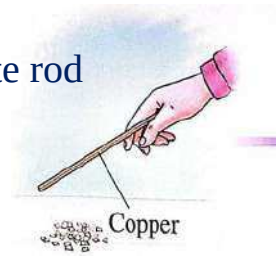
ادلك أحد طرفي قضيب الأبنوس بقطعة من الصوف، ثم قرب القضيب من قطع الورق الصغيرة (قصاصات الورق)

Observation

The paper scraps are attracted to the rod end

تنجذب قصاصات الورق إلى نهاية القضيب

2-Repeat the previous step using a copper rod instead of the ebonite rod



كرر الخطوة السابقة باستخدام قضيب نحاسي بدلًا من قضيب الأبنوس

Observation

The paper scraps are not attracted to the rod end

لا تنجذب قصاصات الورق إلى نهاية القضيب

Conclusion

1-Rubbing certain objects like ebonite with a suitable material like wool gives them the ability to attract lightweight objects because they have been charged with static .electricity (electrostatic charges

1- دلك بعض الأجسام مثل الأبنوس بمادة مناسبة مثل الصوف يعطيها القدرة على جذب الأجسام الخفيفة لأنها مشحونة بالكهرباء الساكنة (شحنات كهروستاتيكية

2-The electric charges settle on the surface of the rubbed part of the object only . and do not transfer to the rest of it

2- تستقر الشحنات الكهربائية على سطح الجزء المدلوك من الجسم فقط ولا تنتقل إلى باقي أجزائه .

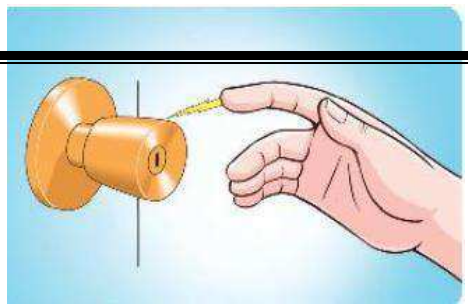
3-Rubbing (friction) certain objects like copper) does not give them the ability to attract lightweight objects (paper scraps

3- دلك بعض الأجسام مثل النحاس (الاحتكاك) لا يعطيها القدرة على جذب الأجسام الخفيفة (قصاصات الورق)

The objects that can be charged with static electricity can be made of

Electrically **conducting** Materials	Electrically **non-conducting** Materials (**insulators**)
Examples :- Carbon All Metals, such as Iron Copper and Aluminum	examples Wood- paper- Wool- Silk- Glass

Feeling a Slight **Electric Shock** When **Touching a metal door handle** after walking barefoot on the carpet... G.R الشعور بصدمة كهربائية خفيفة عند لمس مقبض الباب المعدني بعد المشي حافي القدمين على السجادة	Hearing a Slight **Crackling Sound** When **Taking Off Woolen Clothes** In Winter G.R سماع صوت طقطقة خفيف عند خلع الملابس الصوفية في الشتاء
is **Discharged as a result** of the **Friction with the carpet** لأن لمس المقبض يؤدي إلى تفريغ الشحنة المتكونة على الجسم نتيجة الاحتكاك بالسجادة	**friction with the Woolen Clothes,** The **Electric Charges formed on the body are discharged** الاحتكاك بالملابس الصوفية يتم تفريغ الشحنات الكهربائية المتكونة على الجسم



Charging by friction (rubbing)(الدلك) الشحن بالاحتكاك

The process of charging two uncharged objects by Rubbing Two Objects together
عملية شحن جسمين غير مشحونين عن طريق دلك جسمين معًا

Explanation of Static Electricity -

1-When Two Different **Uncharged Objects are Rubbed** Together

Electrons Transfer from the atoms found on the Surface of One Object to the Atoms Found on the Surface of the Other Object, Causing both to become Electrically Charged with Equal magnitude of Charge but Opposite in Type (sign). Thus
عند دلك جسمين مختلفين غير مشحونين معًا تنتقل الإلكترونات من الذرات الموجودة على سطح أحد الجسمين إلى الذرات الموجودة على سطح الجسم الآخر، مما يتسبب في أن يصبح كلاهما مشحونين كهربائيًا بنفس المقدار من الشحنة ولكن متعاكسين في النوع (الإشارة). وبالتالي

1-The object that loses electrons become positively charged
- يصبح الجسم الذي يفقد الإلكترونات مشحونًا موجبا

2-The object that gains electrons becomes negatively charged
يصبح الجسم الذي يكتسب الإلكترونات مشحونًا سالبة

Application التطبيق

2-When an Ebonite Rod is rubbed with a piece of silk, electron transfer from the silk to the Ebonite Rod
Therefore The Silk becomes Positively(+) Charged, while the Ebonite Rod Becomes Negatively (-)Charged
عند فرك قضيب من الأبنوس بقطعة من الحرير، تنتقل الإلكترونات من الحرير إلى قضيب الأبنوس
يصبح الحرير مشحونًا إيجابيًا، بينما يصبح قضيب الأبنوس مشحونًا سلبيًا

The Charges that accumulate on the surfaces of objects when they lose or gain electrons are describe as static electricity charges
الشحنات التي تتراكم على أسطح الأجسام عندما تفقد أو تكتسب الإلكترونات تسمى شحنات الكهرباء الساكنة

Static Electricity Becomes Negatively Charged الكهرباء الساكنة تصبح مشحونة سالبة

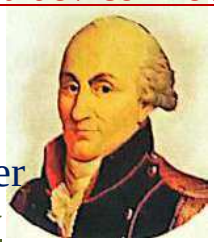
The charges that Accumulate on the surfaces of objects charges static electricity (electrostatic charges)

الشحنات التي تتراكم على أسطح الأجسام تسمى شحنات الكهرباء الساكنة (الشحنات الكهروستاتيكية

Weak electric charge are measured using a device known

يتم قياس الشحنة الكهربائية الضعيفة باستخدام جهاز يعرف باسم

Coulomb meter مقياس كولومب



The law descripting Electric Forces between Charged Particles, Named after Him known as the **inverse-square law**

الفيزيائي الفرنسي الذي صاغ القانون الذي يصف القوى الكهربائية بين الجسيمات المشحونة، والذي سمي باسمه والمعروف باسم قانون التربيع العكسي

The Unit of Electric Charge (Coulomb) وحدة الشحنة الكهربائية (كولومب)

The type of charge acquired by the rubbed object differs depending on the type of the rubbing material

According to the position of the two materials in the electrostatic series, as shown in the opposite figure

Electrostatic Series السلسلة الكهروستاتيكية

The arrangement of materials according to the easiness of losing electrons when rubbed together

ترتيب المواد حسب سهولة فقدان الإلكترونات عند فركها معًا

What happen when one material is rubbed with another

ماذا يحدث عندما يتم فرك مادة بمادة أخرى

Glass
Hair
Wood
Synthetic leather
Silk
Wool
Cotton
Paper
Ebonite

The Electrostatic Series

The material higher on the series المادة الأعلى في السلسلة	The material lower on the series. المادة الأدنى في السلسلة مشحونة سلبيًا
positively charged مشحونة إيجابيًا. Tends to lose electrons تميل إلى فقدان الإلكترونات	Negatively charged. Tends to gain electrons تميل إلى اكتساب الإلكترونات

A The synthetic leather becomes negatively charged, and the wooden rod becomes positively charged because electrons transfer from the wooden rod to the synthetic leather

أ- يصبح الجلد الصناعي مشحونًا سلبًا، ويصبح القضيب الخشبي مشحونًا موجبًا لأن الإلكترونات تنتقل من القضيب الخشبي إلى الجلد الصناعي

G.R.A single material can be charged with either a positive or a negative charge

G.R.يمكن شحن مادة واحدة إما بشحنة موجبة أو سالبة

Because this depends on the type of its rubbing material and its order in the electrostatic series,

لأن هذا يعتمد على نوع مادة فركها وترتيبها في السلسلة الكهروستاتيكية،

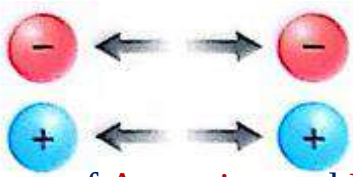
If rubbed with a material higher in the series, it becomes negatively charged, while

if rubbed with a material lower in the series, it becomes positively charged

إذا فركت بمادة أعلى في السلسلة، تصبح مشحونة سلبًا، بينما إذا فركت بمادة أقل في السلسلة، تصبح مشحونة إيجابيًا.

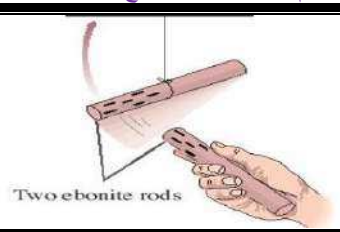
The Electric Forces

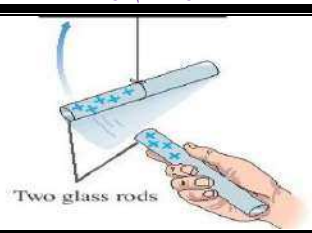
the same type of the electric charges	The different electric charges
(Positive Positive) or (Negative-Negative), التي لها نفس نوع الشحنات الكهربائية (موجبة موجبة) أو (سلبية-سلبية)،	(Positive-Negative), التي لها شحنات كهربائية مختلفة (موجبة-سلبية)،
a **repulsive** electric force arises between them تنشأ بينها قوة كهربائية تنافرية	an **attractive** electric force arises between them تنشأ بينها قوة كهربائية تجاذبية

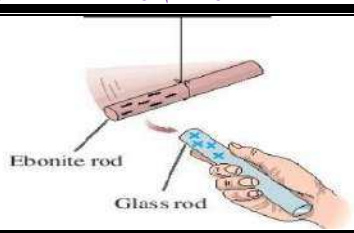


Activity Forces of Attraction and Repulsion between Objects

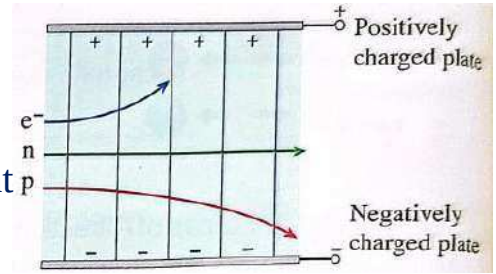
Rub two ebonite rods with a piece of silk and hang one of them freely. then bring the other rod close to it علق قضيب الأبنوس بعد فركه بقطعة من الحرير، ثم قرب قضيب الزجاج بعد فركه بالحرير منه	Rub two glass rods with a piece of silk and hang one of them freely, then bring the other rod close to it افرك قضيبين زجاجيين بقطعة من الحرير وعلق أحدهما بحرية، ثم قرب القضيب الآخر منه	Hang the ebonite rod after rubbing it with a piece of silk, then bring the glass rod, after rubbing it with silk, close to it افرك قضيبين من الأبنوس بقطعة من الحرير وعلق أحدهما بحرية، ثم قرب القضيب الآخر منه







Observation	Observation	Observation
The free-moving rod moves away (repelled) from the fixed rod يتحرك القضيب الحر الحركة أقرب (منجذبًا) إلى القضيب الثابت	The free-moving rod moves away (repelled) from the fixed rod يتحرك القضيب الحر الحركة بعيدًا (منفرًا) عن القضيب الثابت	The free-moving rod moves closer (attracted) to the fixed rod يتحرك القضيب الحر الحركة أقرب (منجذبًا) إلى القضيب الثابت
Explanation and Conclusion		
Rubbing the ebonite rods with silk gave them the same negative charges, leading to the repulsion between them فرك قضبان الزجاج بالحرير أعطاهم نفس الشحنات الموجبة، مما يؤدي إلى التنافر بينهما	Rubbing the glass rods with silk gave them the same positive charges, leading to the repulsion between them فرك قضبان الأبنوس بالحرير أعطاهم نفس الشحنات السالبة، مما يؤدي إلى التنافر بينهما.	The charge formed on the ebonite rod when rubbed with piece of silk negative, while the charge formed o the glass rod when rubbed with the same piece of silk is positive, leadin to the attraction between them الشحنة المتكونة على قضيب الأبنوس عند فركه بقطعة من الحرير تكون سالبة، بينما الشحنة المتكونة على قضيب الزجاج عند فركه بنفس قطعة الحرير تكون موجبة، مما يؤدي إلى التجاذب بينهما



(G.R.) -The electrons are deviated towards the positive plate,

تنحرف الإلكترونات نحو الصفيحة الموجبة ، (G.R.)

Because they are negatively charged and the different charges attract each other

لأنها مشحونة سلبًا والشحنات المختلفة تتجاذب مع بعضها البعض

,(G.R.) -The neutrons pass in a straight line without deviation

Because they are neutrally charged

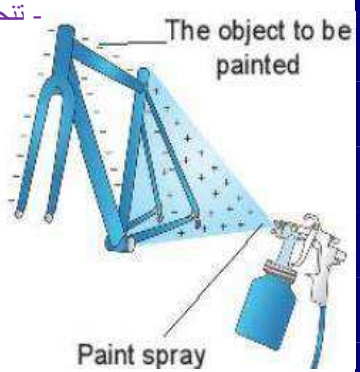
- تمر النيوترونات في خط مستقيم دون انحراف (G.R.) لأنها مشحونة محايدة

-The protons are deviated towards the negative plate,

Because they are positively charged and the different charges attract each other

- تنحرف البروتونات نحو الصفيحة السالبة لأنها مشحونة بشحنة موجبة والشحنات المختلفة تجتذب بعضها البعض

The Electrostatic Plating الطلاء الكهروستاتيكى



1-The object to be plated is charged with a negative electric charge

-The paint spray is charged with a positive electric charge

1-الجسم المراد طلائه مشحون بشحنة كهربائية سالبة -رذاذ الطلاء مشحون بشحنة كهربائية موجبة

2-When sprayed, the paint particles are attracted to the object to be plated due to the difference in their charges

2-عند رشه، تنجذب جزيئات الطلاء إلى الجسم المراد طلائه بسبب اختلاف شحناتها

Advantages 1-Ensures an even layer of paint 2-Reduces paint waste

The electric field المجال الكهربى

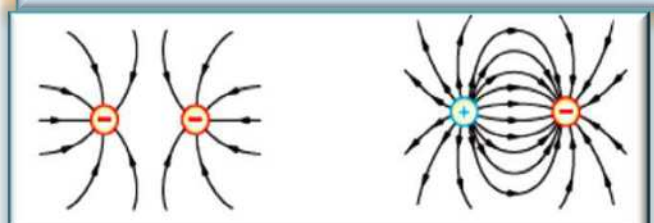
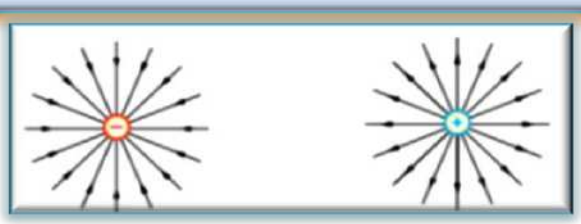
The electric field The region of space surrounding an electric charge in which its effect appears.

المجال الكهربائي المنطقة من الفضاء المحيطة بالشحنة الكهربائية والتي يظهر فيها تأثيرها.

Electric Field Lines Imaginary lines that show the path taken by a small free-moving positive charge placed in the electric field.

خطوط المجال الكهربائي خطوط وهمية توضح المسار الذي تسلكه شحنة موجبة صغيرة تتحرك بحرية وتوضع في المجال الكهربائي.

Shapes of Electric Force Lines of the Electric Charges

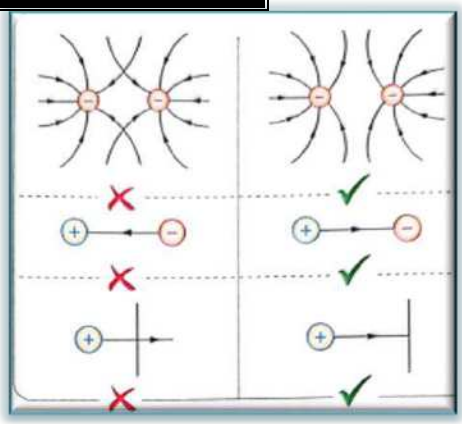
Electric force lines between two charges	Electric force lines between single charge
	

Electric force line for a similar charges	Electric force line of different charges	Electric force lines for a negative charge	Electric force lines for a positive charge

Electric force lines between

Two metallic plates with different charges	charged plates and an opposite charges

Properties of Electric Force Lines



1-Imaginary lines that do not intersect each other

1- خطوط وهمية لا تتقاطع مع بعضها البعض

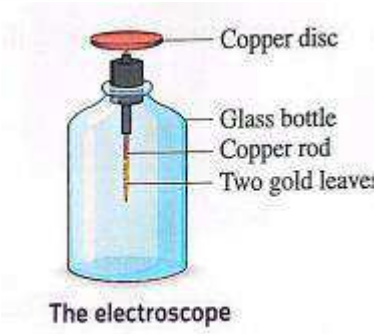
2- They start from the positive charge and end at the negative charge.

تبدأ من الشحنة الموجبة وتنتهي عند الشحنة السالبة

3- They ends at the surfaces of charged metal objects and do not penetrate them,

تنتهي عند أسطح الأجسام المعدنية المشحونة ولا تخترقها،

The electroscope device الكشاف الكهربى



The electroscope

It's composition

1-Copper disc 2- Glass container.

3- Copper rod. 4-Two gold leaves

5-Copper rod Two gold leaves

It's uses

A-To detect the electric state of an object: لاكتشاف الحالة الكهربائية لجسم ما

(1) Touch the metal disc of one electroscope with your hand to ensure it is not charged by any electroscope

(1) المس القرص المعدني لأحد المكشافات الكهربائية بيدك للتأكد من عدم شحنه بواسطة أي مكشاف كهربائي

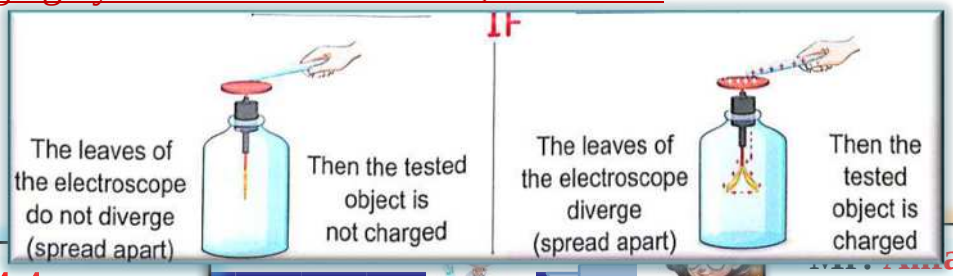
(2) Bring the object to be located close to the electroscope disc until it touches it

(2) قم بتقريب الجسم المراد وضعه بالقرب من قرص المكشاف الكهربائي حتى يلمسه

the electroscope disc and the two gold leaves to acquire the same type of charge as the rod

يؤدي الشحن عن طريق التلامس إلى حصول قرص المكشاف الكهربائي والورقتين الذهبيتين على نفس نوع الشحنة التي حصل عليها القضيب

Charging by contact can be defined, as follows


The leaves of the electroscope do not diverge (spread apart)
Then the tested object is not charged
The leaves of the electroscope diverge (spread apart)
Then the tested object is charged

Determining the type of charge on a charged object تحديد نوع الشحنة على جسم مشحون

1-Charge the electroscope with a certain electric charge, for example, a positive charge

1- شحن المكشاف الكهربائي بشحنة كهربائية معينة، مثلاً شحنة موجبة

2-Bring the charge of the tested object close to the electroscope disc without touching it

2- تقريب شحنة الجسم المُختبر من قرص المكشاف الكهربائي دون لمسه

G.R. The separation (divergence) between the gold leaves of a positively charged electroscope decreases when an ebonite rod rubbed with wool is brought close to .the electroscope disc

تقل المسافة (التباعد) بين أوراق الذهب في الكشاف الكهربائي المشحون إيجابيا عندما يتم تقريب قضيب الأبنوس الذي تم فركه بالصوف من قرص الكشاف الكهربائي

Because the ebonite rod acquires a negative charge when rubbed with wool, and thus the divergence of the gold leaves decrease due to the difference in charge

لأن قضيب الأبنوس يكتسب شحنة سالبة عند فركه بالصوف، وبالتالي تقل مسافة تباعد أوراق الذهب بسبب اختلاف الشحنة

The electroscope can be used for يمكن استخدام الكشاف الكهربائي في

1-Detecting if an object is electrically charged الكشف عما إذا كان الجسم مشحونا كهربائيا

2-Determining the type of charge on a charged object تحديد نوع الشحنة على جسم مشحون

3-Comparing the magnitude of charges on different charged objects

مقارنة مقدار الشحنات على أجسام مشحونة مختلفة

1-In charging by contact في الشحن عن طريق التلامس

-The charged object touches the object to be charged without rubbing

يلامس الجسم المشحون الجسم المراد شحنه دون فرك

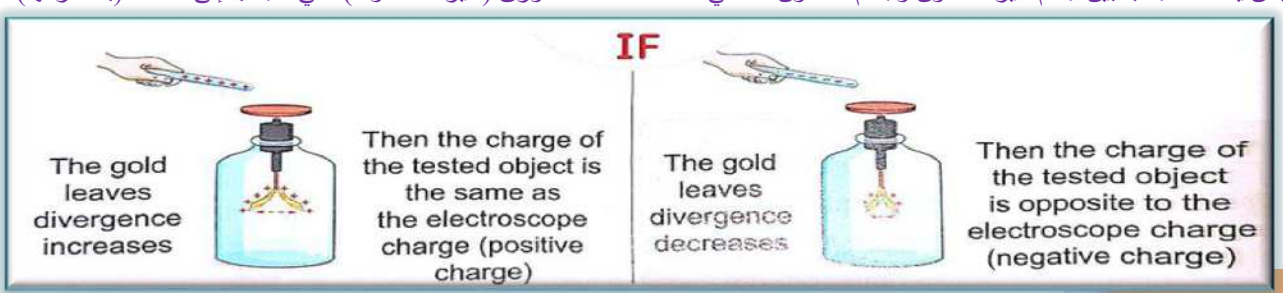
-The object to be charged acquires the same type of charge as touching object

يكتسب الجسم المراد شحنه نفس نوع الشحنة التي يكتسبها الجسم الملامس

2-Attraction can occur between an uncharged object and a charged object

-as in the case of paper scraps (uncharged) being attracted to a comb (after being rubbed)

يمكن أن يحدث الجذب بين جسم غير مشحون وجسم مشحون كما في حالة قصاصات الورق (غير المشحونة) التي تنجذب إلى المشط (بعد فركها)


IF
The gold leaves divergence increases
Then the charge of the tested object is the same as the electroscope charge (positive charge)
The gold leaves divergence decreases
Then the charge of the tested object is opposite to the electroscope charge (negative charge)

1-Explain why the paper scraps were attracted to th e comb

1- اشرح لماذا انجذبت قصاصات الورق إلى المشط

Because the comb friction with the dry hair gave it an electric charge that caused it to attract the paper scraps

لأن احتكاك المشط بالشعر الجاف أعطاه شحنة كهربائية جعلته يجذب قصاصات الورق

2-What happens to the paper scraps a few moments after they are attracted to the comb? Explain

٢- ماذا يحدث لقصاصات الورق بعد لحظات من انجذابها للمشط؟

Paper scraps fall off after a few moments, because the contact with the comb gives the paper pieces the same charge as the comb

تتساقط قصاصات الورق بعد لحظات قليلة، لأن ملامسة المشط تعطي قطع الورق نفس شحنة المشط

1-Fuel transport vehicles have metal chain that dangle to touch the ground.. G.R

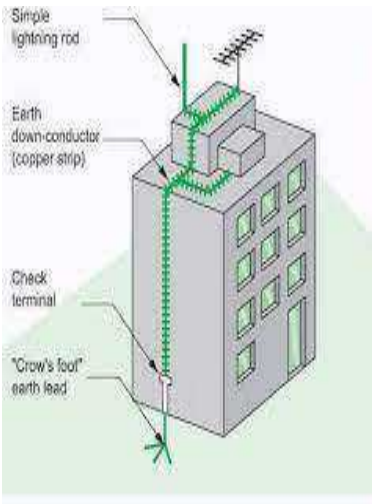
تحتوي مركبات نقل الوقود على سلسلة معدنية تتدلى لتلامس الأرض

To discharge the electric charges generated by the friction of the fuel with the surface of the fuel tank, to prevent fuel combustion

لتفريغ الشحنات الكهربائية الناتجة عن احتكاك الوقود بسطح خزان الوقود، لمنع احتراق الوقود

مدبب، يسمح بمرور الشحنات الكهربائية المتراكمة من السحب القريبة من خلاله إلى الأرض دون التسبب في أي ضرر للمبنى

Lightning Rod



It's composition تركيبه مانع الصواعق

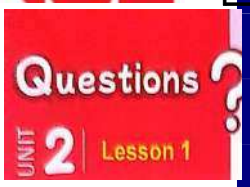
A metal rod, **the lower end** fixed in a plate buried in the ground

قضيب معدني، الطرف السفلي: مثبت في صفيحة مدفونة في الأرض

The upper end pointed, allowing accumulated electric charges from nearby clouds to pass through it to the ground without causing any damage to the building

الطرف العلوي مدبب، يسمح بمرور الشحنات الكهربائية المتراكمة من السحب القريبة من خلاله إلى الأرض دون التسبب في أي ضرر للمبنى

Unit (2) Lesson (1)



1-Write the scientific term for each of the following

From the beginning of the lesson until the electric field

(1) The materials on which electric charges accumulate, provided that the charged part of them is insulated (…….)

(2) The process of charging two uncharged objects by rubbing them together (…….)

(3) The charges formed on the object that loses electrons when rubbed (…….)

(4)The charges formed on the object that gains electrons when rubbed (…….)

(5)The accumulated charges on the surfaces of objects when they lose or gain electrons (…….)

(6)The measuring unit of electric charge (…….)

(7)The order of materials according to the easiness of losing electrons when they are rubbed together (…….)

(8)Subatomic particles which are deflected towards the negative plate when they a pass through an electric field (…….)

From the electric field until the end of the lesson

(9) The region of space around an electric charge, in which its effect appears (…….)

(10) Imaginary lines that show the path taken by a small free-moving positive charge placed in the electric field (…….)

(11) A device used to determine if an object is electrically charged and the type of charge on them (…….)

(12)The process of charging an uncharged object by another charged object due to their contact (…….)

2-Choose the correct answer

From the beginning of the lesson until the electric field

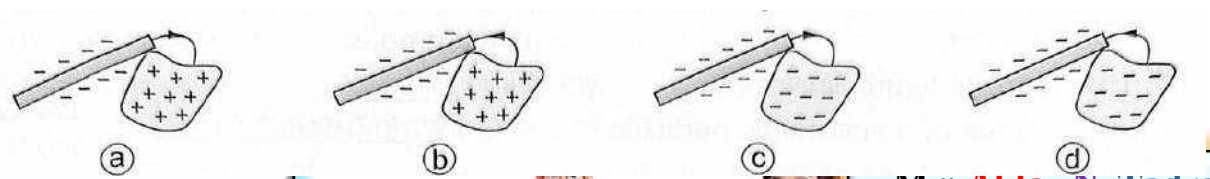
1-Among the electrical conductors is……

a. a glass rod. b. a wooden ruler c. a plastic straw d a metal nail.

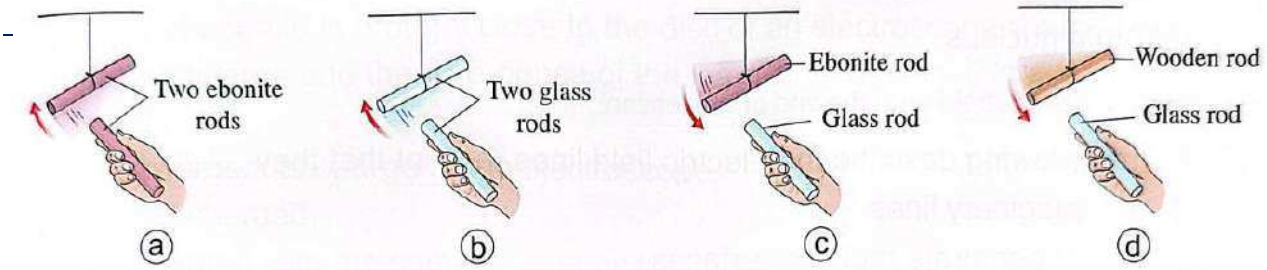
2- All the following are electrical no conducting materials, except

a. wood b. carbon c. ebonite d. silk

3-When a rod is rubbed with a piece of cloth, it acquires a negative electric charge. Which of the following explains how the electric charges transferred between them



4-The following figures show rods made of different materials, where the stable rod was brought close to the free-moving rod after rubbing both of them w th a piece of silk in each time- Which of these figures is incorrect



5-Which of the following materials gains electrons when rubbed with a piece of wool?

a. Wood. b. Glass. c. Silk. d. Paper

6-All the following materials precede cotton in the electrostatic series, except

a. silk. b. glass. c. ebonite. d. wool

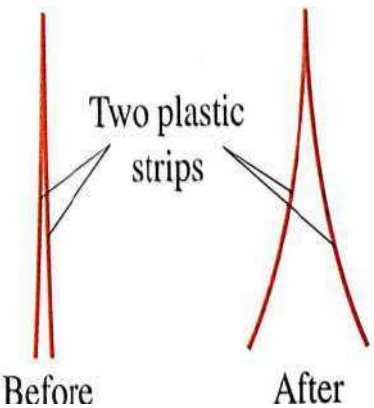
7-When a carbon rod is rubbed with dry silk, no electrostatic charge is generated on the carbon rod. What is the reason for this?

a. Carbon precedes silk in the electrostatic series
b. Silk precedes carbon in the electrostatic series
c. Silk is a non-conducting material
d. The carbon rod is not insulated

8-A balloon hanged by a nylon string repels a rod of ebonite, because the ebonite rod

a. carries a charge opposite to that of the balloon
b.carries i the same charge as the balloon
c.is charged, and the balloon is uncharged
d.is uncharged, and the balloon is charged

9-The opposite figure a shows two identical strips of plastic before and after being rubbed with a dry piece of cloth



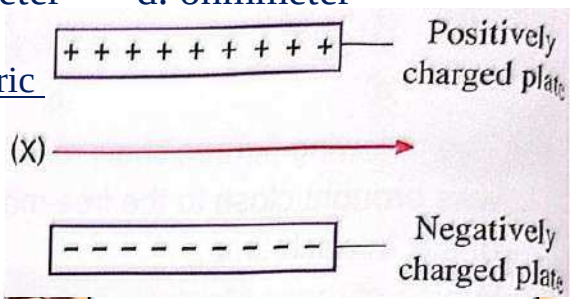
Which of the following expresses the charge on the strips after rubbing and the force between them?

a. Different/Attraction forces
b. Different/Repulsion forces
c. Similar /Attraction forces
d. Similar/Repulsion forces

10-The magnitude of static electric charge is measured by a device called a

a. Ammeter b. Coulomb Meter c. Voltmeter d. ohmmeter

11-The Opposite figure illustrates the passage of a Subatomic Particles between two plates of an electric field What is the particle (x)



a. Proton b. Neutron
c. Electron Atom d. Nucleus

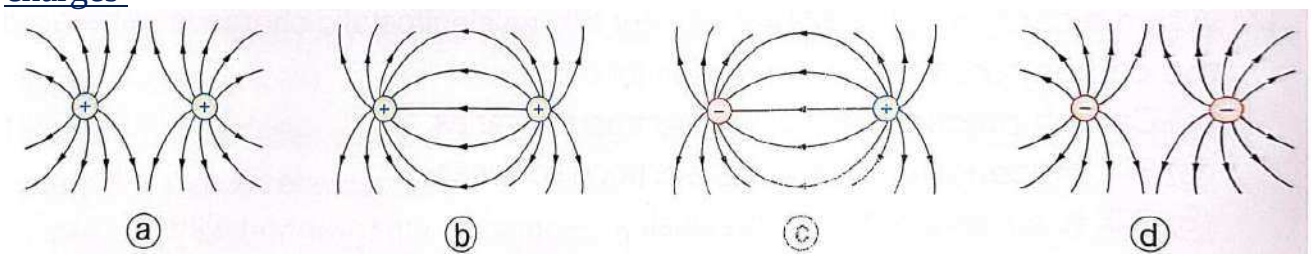
From the electric field until the end of the lesson .

12- All the following Describe the Electric Field Lines, except that they

a. are imaginary lines b. Do not penetrate metallic s Surfaces

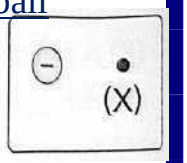
c. are interesting lines d. start at the positive charge

13-Which of the following figures shows the electric field lines between two electric charges

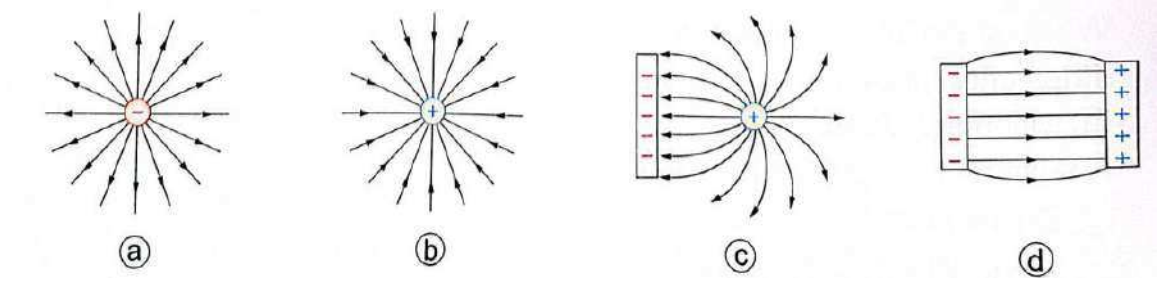


14-The Opposite Figure Shows Point (X) is located near a negatively charged ball

Which of the following expresses the direction of the electric field at point (x)



15-Which of the following figures shows the direction of the electric field lines



16-Which of the following occurs when a glass rod is rubbed with a piece of silk

a. The force lines start from the glass rod

b. The force lines end at the glass rod

c. The piece of silk is charged positively

d. The force lines start from the piece of silk

17- What is the charge of the electroscope shown in the opposite figure?

a. Positive charge b. Negative charge

c. Neutral charge d. Unknown charge

18-If a rod of ebonite is brought close to the disc of an electroscope charged with a certain charge and the divergence of the leaves decreases, this means that the rod

a. Discharged Its Charge to the Electroscope

b. is not charged

c. is charged with the same charge as the electroscope.

d. is charged with a charge opportunity to that of the electroscope

19-To determine the type of charge on an object, it was brought close to the disease of a charged electroscope, so the angle between the leaves increased
Which of the following can be the electrical charge of each of the object and The Electroscope Respectively
a. Positive Charge/Negative Charge. b. Positive Charge/Positive Charge. c. Negative Charge/Positive Charge. d. Positive Charge/Neutral Charge

20-Which of the following expresses what happens to the two leaves of a negatively charged electroscope when a piece of synthetic leather rubbed with wool is brought close to its disc a. The leaves return applicable b. The leaves divergence decreases
c. The leaves divergence increases d. The leaves divergence is not affected

3-An electroscope its leaves diverge at an angle (X), and a certain rod is brought close to the disc of the electroscope

Choose from column (B) what suits it in column (A)
An Electroscope Its Leaves Diverge at An Angle (X), and a Certain Rod is Brought Close

(A)	(B)
1-The angle between the leaves remains (X)	1-The rod is charged with the same type of charge as the electroscope
2-The angle between the leaves becomes greater than (X)	2-The rod is charged with a charge .opposite to that of the electroscope
3-The angle between the leaves becomes less than (X)	3-The rod is not charged
	4-The electroscope is not charged

4-Mark(√) or (X) For each statement, with correction

From the beginning of the lesson until the electric field

1- Metal Objects can be charged with static electric charges when the charge Part is insulated ( )
2- When an uncharged object made of an insulating material is rubbed with a suitable material, an electric charge is formed only on the rubbed ( )
3- Coulomb formulated the inverse square law ( )
4-The charge on the rubbed object varies depending on the type of the rubbing material ( )
(5) Both silk and wood acquire the same electric charge when each of them is rubbed separately with synthetic leather ( )
(6) When synthetic leather is rubbed with a piece of silk, silk loses electrons ( )

7-A freely suspended ebonite rod is repelled from a glass rod after each of them is rubbed with a piece of wool ( )
8-Electrons are neutrally charged particles that are not deflected by the effect of an electric field ( )
9-Electric force lines are imaginary lines and do not intersect
10-The lightning rod system is used to determine the magnitude of the electric charge on charged objects ( )
11-The disc and leaves of the electroscope are made of conductive materials ( )
12-The gold leaves become diverged when the electroscope is charged ( )
13-When an object is brought close to the disc of a charged electroscope and the leaves divergence decreases, it means that the object has the same type of charge as the electroscope ( )
14-The lightning rod discharges the accumulated electric charges on clouds ( )

5-Mention one Importance for each of the following

1-Coulomb Meter
2-Electrostatic Plating
3-Electroscope
4-The dangled metal chain which is connected to fuel tanks and touching the ground
5-Lightning Rod

6-Give reason of each of the following

From the beginning of the lesson until the electric field

1-Hearing crackling sound when taking off woolen clothes in winter
2-You feel a slight electric shock when you touch metal handle after walking barefoot on the carpet
3-The attraction of paper pieces to an ebonite rod rubbed with wool
4-When an ebonite rod is rubbed with cotton, cotton acquires a positive charge, while ebonite acquires a negative charge
5-The type of electric charge generated on an ebonite rod differs from that generated on a glass rod after each of them is rubbed separately with silk
6-The type of charge generated on each of the dry silk and a glass rod differs after they are rubbed together
7-The same material can be charged with either a positive or a negative charge
8-Paper pieces are attracted to a wooden rod after each of them is rubbed with silk

9-Two pieces of silk repel each other after each of them is rubbed separately with cotton
10-Neutrons are not deflected when they pass through an electric field
11-In the presentation of an electric field between two plates, protons are defined towards the negative plate
12-Electrostatic Plating is preferred for painting metals

From the electric field until the end of the lesson

13-Touching the electroscope disc with the hand before using it.
14-The divergence of the electroscope gold leaves when a charged object touches the disc
15-The divergence of the lives of the positive electroscope increases when a glass Rod Rubbed with Silk is Brought Close to the disc
16-The Divergence of the Negatively Charged Electroscope when a Wooden Rod Rubbed with Wool is Brought Close to the Disc
17-The Lightning Rod has an important protective role

What is meant by

From the beginning of the lesson until the electric field

1- Charging by Friction (friction) (2) Static Electricity (Electrostatics)
3-Electrostatic series

From the electric field until the end of the lesson

4-Electric Field
5-Electric Field Lines Electric Force Lines
6-Charging by Contact

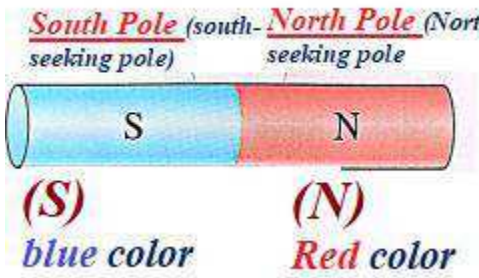
Lesson (2) Magnetic force

The Magnets

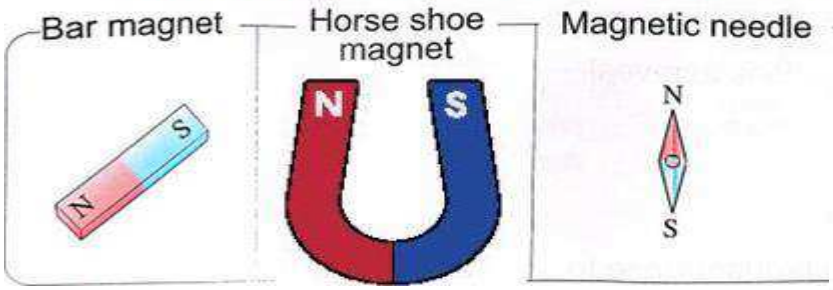
Natural magnet (Lodestone)

► The natural magnet is characterized by its ability to attract metallic objects.

Any magnet has two ends known as the magnetic poles, which are:

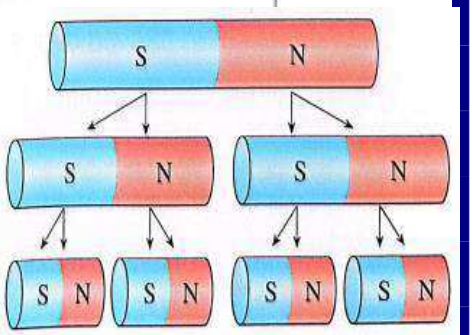


The shapes of artificial magnets vary, including:



When a single magnet is divided. into several parts, each part of them forms a new magnet with two poles, one is the North (N) and South (S).

عندما يتم تقسيم مغناطيس واحد إلى عدة أجزاء، فإن كل جزء منها يشكل مغناطيسًا جديدًا له قطبان، أحدهما شمالي (N) والآخر جنوبي (S).



This means that it is impossible to obtain a single (an isolated) magnetic pole solely.

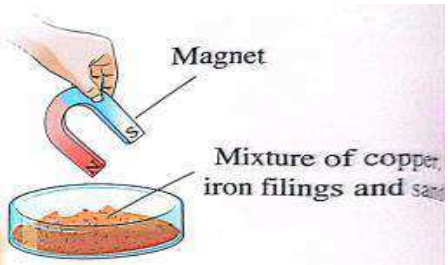
وهذا يعني أنه من المستحيل الحصول على قطب مغناطيسي واحد (منعزل) فقط.

Metallic materials are classified according to their attraction to magnets into:

1. Magnetic materials	2. Non-magnetic materials
These are materials that attracted to magnets	These are materials that are not attracted to magnets
Examples Steel- -Cobalt –Iron-Nickel	Examples Gold –Aluminum- Copper -Silver

Mr: Alifaz.N. Tadrous
01005136959- 01222978682
D.M.RAZK موقع الدكتور محمد رزق معلم الكيمياء التعليمي

What happens when?



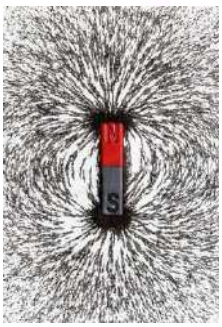
A magnet is brought close to a mixture of copper filings, iron filings and sand.
Only iron filings are attracted to the magnet.

Forensic and criminal investigation experts

use **magnetic brush** and **iron filings** in criminal investigations to reveal the unclear fingerprints.
يستخدم خبراء الطب الشرعي والتحقيق الجنائي الفرشاة المغناطيسية وبرادة الحديد في التحقيقات الجنائية للكشف عن بصمات الأصابع غير الواضحة

. Some iron filings stick to the traces left by the fingerprints, which making them visible.
تلتصق بعض برادة الحديد بالآثار التي تتركها بصمات الأصابع، مما يجعلها مرئية.

خصائص المغناطيس Properties of Magnets



1-The attraction force is the strongest at its poles, and it decreases as it gets closer to the middle of the magnet.
قوة الجذب تكون أقوى ما يمكن عند أقطابه، وتقل كلما اقترب من منتصف المغناطيس.

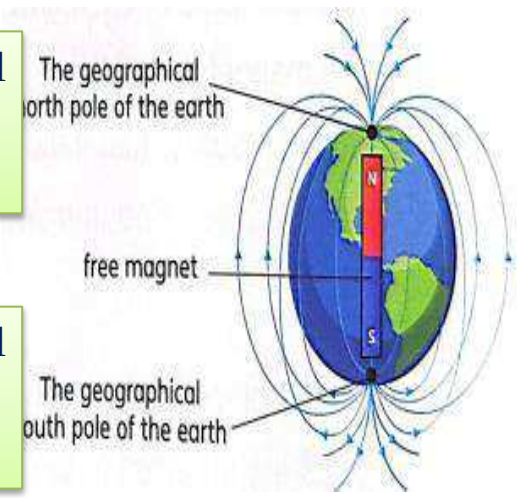
What happens when? ماذا يحدث عندما؟

A bar magnet is dipped into iron filings.
-Iron filings are attracted to the magnet, with the highest density of filings at the poles of the magnet, and the density of the filings decreases at the middle of the magnet.
يتم غمس قضيب مغناطيسي في برادة الحديد. تنجذب برادة الحديد إلى المغناطيس، مع أعلى كثافة للبرادة عند أقطاب المغناطيس، وتقل كثافة البرادة عند منتصف المغناطيس.

2- A magnet always takes a certain direction when it is suspended freely, influenced by the Earth.
The earth acts as a giant magnet, where:

A-The magnetic **South Pole (S)** of the earth → is → The geographical **north pole** of the earth

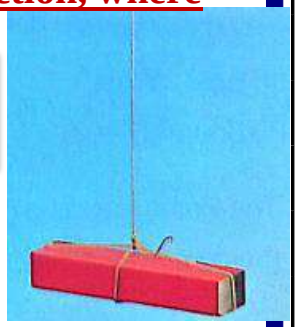
B-The magnetic **North Pole (N)** of the earth → is → The geographical **South pole** a the earth



When a magnet is suspended freely, it always takes a certain direction, where

A-The **North Pole (N)** of the **freely** suspended magnet **Points towards** The geographical **north** pole of the earth

A-The **South Pole (N)** of the **freely** suspended magnet **Points towards** The geographical **South** pole of the earth



البوصلة The Compass

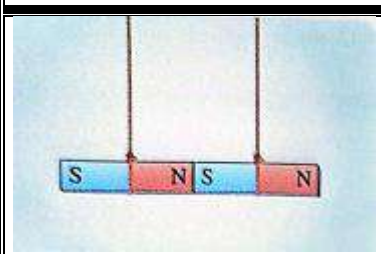
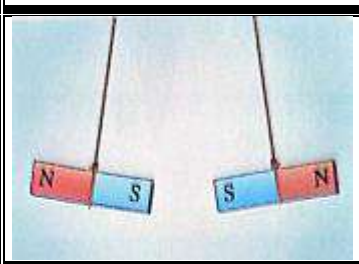
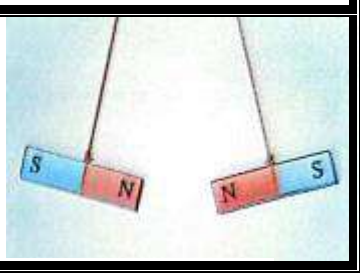
It's structure A free-moving magnetic needle fixed at its pivot.
إبرة مغناطيسية حرة الحركة مثبتة عند محورها.

Placed inside a copper or plastic box... G.R
توضع داخل صندوق من النحاس أو البلاستيك... ج.ر

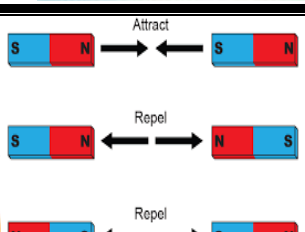
To prevent the attraction between the needle and the box material, which can affect on its movement
لمنع الجذب بين الإبرة ومادة الصندوق، مما قد يؤثر على حركتها

It's importance
It used to determine the Earth's four main geographical directions
تستخدم لتحديد الاتجاهات الجغرافية الأربعة الرئيسية للأرض

Law of Attraction and Repulsion What happens when?

Two different poles of magnets are brought together(2 north –2south)	A south pole of a magnet is brought close to south pole of another magnet	A north pole of a magnet is brought close to north pole of another magnet
يتم تقريب القطب الشمالي لمغناطيس إلى القطب الشمالي لمغناطيس آخر	يتم تقريب القطب الجنوبي لمغناطيس إلى القطب الجنوبي لمغناطيس آخر	يتم تقريب قطبين مختلفين للمغناطيس معًا
The poles of the two magnets attract each other	The poles of the two magnets repel each other	The poles of the two magnets repel each other
قطبا المغناطيسين يتجاذبان	قطبا المغناطيسين يتنافران	قطبا المغناطيسين يتنافران
		

Law of Attraction and Repulsion



Like (similar) magnetic poles repel each other -
Unlike (different) magnetic poles attract each other.
الأقطاب المغناطيسية المتشابهة تتنافر مع بعضها البعض.
الأقطاب المغناطيسية المختلفة تتجاذب مع بعضها البعض

Mr. Amar. Tadrous
01005136959- 01222978682
D.M.RAZK موقع الدكتور محمد رزق معلم الكيمياء التعليمي

Magnetic Field The space around magnetic, and affects magnetic materials placed in it at a distance by a magnetic force.

الفضاء المحيط المغناطيس ، ويؤثر على المواد المغناطيسية الموضوعة فيه على مسافة ما بواسطة قوة مغناطيسية.

The field is represented by imaginary lines called magnetic field lines.

يمثل المجال المغناطيسي خطوطاً وهمية تسمى خطوط المجال المغناطيسي

The Magnetic Field المجال المغناطيسي	**Magnetic Field Lines** خطوط المجال المغناطيسي
The region of space around a magnet where the effect of its magnetic force appears in it المنطقة من الفضاء حول المغناطيس والتي يظهر فيها تأثير قوته المغناطيسية	They are imaginary Ines that represent the force of the magnetic field هي خطوط وهمية تمثل قوة المجال المغناطيسي

Properties of Magnetic Field Lines خصائص خطوط المجال المغناطيسي

1- Imaginary lines that do not intersect each other.

1- خطوط وهمية لا تتقاطع مع بعضها البعض.

2- They start from the north pole of the magnet and end at the south pole.

2- تبدأ من القطب الشمالي للمغناطيس وتنتهي عند القطب الجنوبي.

3-They are denser near the poles and far separated as they move away from them.

3- تكون أكثر كثافة بالقرب من القطبين وتتباعد كلما ابتعدت عنهما.

Electric field and magnetic field:

Electric field المجال الكهربائي	Magnetic field المجال المغناطيسي
The region of space around an electric charge where its effect appears in it منطقة الفضاء المحيطة بالشحنة الكهربائية حيث يظهر تأثيرها فيها	The region of space around a magnet where the effect of its magnetic force appears in it منطقة الفضاء المحيطة بالمغناطيس حيث يظهر تأثير قوته المغناطيسية فيها

Electric field lines and magnetic field lines

Electric field lines خطوط المجال الكهربائي	Magnetic field lines خطوط المجال المغناطيسي
Imaginary lines that do not intersect each other خطوط وهمية لا تتقاطع مع بعضها البعض	Imaginary lines that do not intersect each other خطوط وهمية لا تتقاطع مع بعضها البعض
They start from the positive charge and end at the negative charge تبدأ من الشحنة الموجبة وتنتهي عند الشحنة السالبة	They start from the north pole of the magnet and end at the south pole of the magnet تبدأ من القطب الشمالي للمغناطيس وتنتهي عند القطب الجنوبي للمغناطيس
They end at the surfaces of charged objects and do not penetrate them تنتهي عند أسطح الأجسام المشحونة ولا تخترقها	They are denser near the poles and far separated as they move away from them تكون أكثر كثافة بالقرب من القطبين وتتباعد كلما ابتعدت عنهما

Lesson (2)

1-Write the scientific term for each of the following:

From the beginning of the lesson until the electric field

(1)A natural rock that has the ability to attract objects made of iron.( )

(2) Materials that are attracted to a magnet.( )

(3) Materials that are not attracted to a magnet. .( )

(4) An old tool used to determine the four main geographical directions of the Earth.( )

(5) The geographical pole of the Earth that the north pole of a freely-suspended magnet points to .( )

From the law of attraction and repulsion until the end of the lesson

(6) Like magnetic poles repel, and unlike magnetic poles attract .( )

(7) The region of space around a magnet where the effect of its magnetic force appears in it .( )

(8) Imaginary Ines that represent the force of the magnetic field .( )

(9) The mutual magnetic force between a magnet and a magnetic material within Its field .( )

2-Complete the following statements;

From the beginning of the lesson until the law of attraction and repulsion

(1) The industrial magnets have the shapes of a ……or a horse shoe or a…….

(2) ……can be separated from a mixture of iron filings and sand by using…

(3) When a magnet is brought close to pieces of nickel and aluminum, …… is attracted to the magnet, while is ……not attracted to it is

(4) The magnetic needle of the ……tool is placed inside a box made of copper or……

(5) The north pole of a magnet is symbolized by the letter……. while the South Pole is symbolized by the letter …….

(6) Metallic materials are divided according to their attraction to magnets into materials and ……..materials.

(7) Forensic and criminal Investigation experts use ……fillings and a…… brush to reveal the unclear fingerprints. .

(8) When a magnet is suspended freely, its south pole points to the geographical ……pole of the Earth.

From the law of attraction and repulsion until the end of the lesson

(9) An……. force arises between the north pole of a magnet and the south pole of another magnet, while a…… force arises between the south pole of a magnet and the south pole of another magnet.

(10) Magnetic field lines start from the ……..pole and end at the…….. pole.

(11) ……field lines end at the metallic surfaces, while ……..field lines penetrate delicate surfaces.

(12) The region of space around a positive charge where its effect appears in it is called ……while the region of space around a magnet where the effect of its magnetic force appears in it is called……..

(13) When two positive charges are brought close to each other, a force of ……arises between them, while when the north pole of one magnet is brought close to the south pole of another magnet, ……occurs

3-Choose the correct answer:

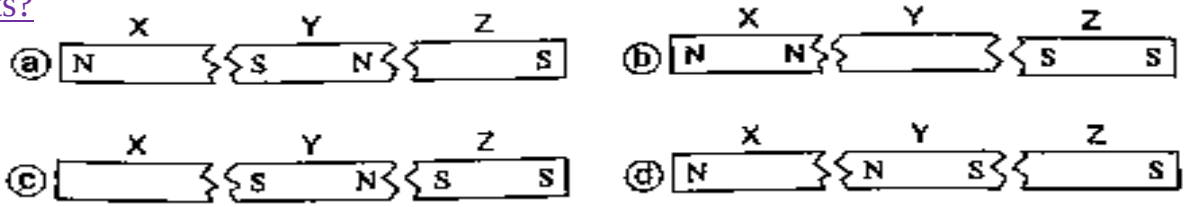
From the beginning of the lesson until the law of attraction and repulsion

(1) All the following industrial magnets, except

a. lodestone b. horse shoe magnet. c. magnetic needle. d. bar magnet.

(2) The opposite figure shows the division of a magnet into three parts X, Y and Z

Which of the following represents the poles of these parts?



(3) All the following metals are attracted to a magnet, except

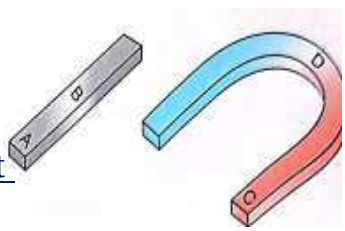
a. Iron b. nickel c. cobalt d. aluminum

(4) When a magnet is brought close to a mixture containing the filings of each of silver, copper, iron, aluminum and cobalt, the materials that are attracted to the magnet are

a. iron only. b. silver and copper only.

c. iron arid cobalt only d. aluminum and silver only.

(5) The opposite figure represents two magnets, one Is a bar magnet and the other is u-shaped, when these magnets are brought close to some pins, their attraction becomes the strongest at the points



a. A and B b. C and D c. Band D d. A and C

(6) The south pole of a compass needle points to

a. The geographical east pole of the earth.

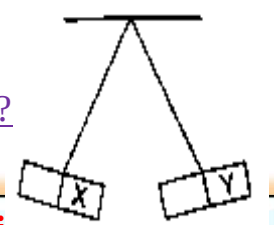
b. The geographical north pole of the earth.

c. The geographical west pole of the earth.

d. The geographical south pole of the earth.

From the law of attraction and repulsion until the end of the lesson

(7) The opposite figure represents two freely-suspended magnets.

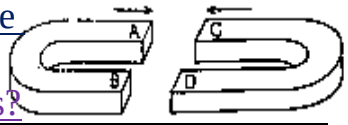


Which of the following represents the type of the poles (X) and (Y)?

a. (X): North, (Y): North b. (X) North, (Y) South

c. (X): South, (Y): South d. (X) North, (Y) West

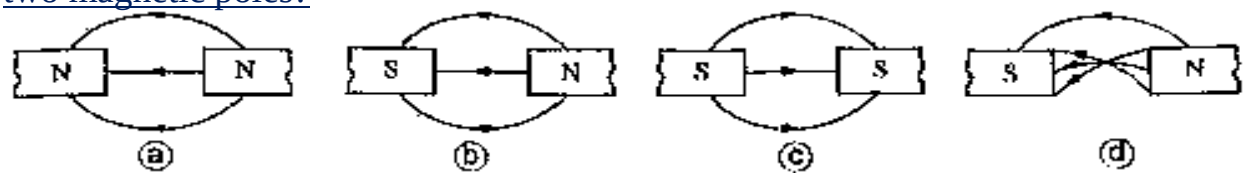
(8) The poles of two magnets attract each other when brought close together, as shown in the opposite figure.



Which of the following represents the type of poles of the magnets?

Choices	Pole (A)	Pole (B)	Pole (C)	Pole (D)
a	North	North	South	South
b	North	South	North	North
c	North	South	South	North
d	North	South	North	South

(9) Which of the following shapes represents correctly the magnetic field lines between two magnetic poles?



(10) When a magnet is brought close to a place of cobalt

a. an attractive force arises between them,

b. a repulsive force arises between them

c. both an attractive and a repulsive forces arise between them.

d. no force arises between them.

(11) All the following describe both electric and magnetic field lines, except that they are

a. imaginary b. flexible c. do not intersect. D. crowd at the poles

4-Mark(√) or (x) for each statement, with correction:

From the beginning of the lesson until the law of attraction and repulsion

(1) Metal paper clips are attracted to the magnet. ( )

(2) The density of iron fillings is the greatest at the middle of the magnet ( )

(3) When a magnet is divided into several parts, each part becomes a new magnet with a north and a south poles ( )

(4) Magnetic forces increase closer to the poles of the magnet. ( )

(5) The compass box is made of plastic so that it does not affect the direction of the magnetic needle ( )

From the law of attraction and repulsion until the end of the lesson

(6) The north pole of a magnet attracts the north pole of another magnet ( )

(7) A repulsive force arises between a magnet and some materials. ( )

(8) Electric field lines art from the positive charge, while magnetic field lines start from the pole of the magnet ( )

(9) Magnetic field lines extend between two negative electric charges. ( )

(10) The compass needle is deflected when a magnet is brought close to it ( )

5-What is meant by:

(1) Magnetic materials.
(2) Non-magnetic materials.
(3) The law of attraction and repulsion in magnetism..
(4) Magnetic field.
(5) Magnetic field lines.

6-Give reasons of each of the following

From the beginning of the lessen until the law of attraction and repulsion

(1) Both iron and steel are magnetic materials.
(2) Copper and gold are non-magnetic materials.
(3) Not all metals are magnetic materials
(4) Forensic experts use a magnetic brush and iron fillings to reveal the unclear fingerprints
(5) The density of iron filings increases at the poles of the magnet.
(6) A magnet always takes a certain direction when it is suspended freely.
(7) The magnetic needle of a compass is placed inside a copper box.
(8) The compass box is not made of Iron.

From the law of attraction and repulsion until the end of the lesson

(9) A moving magnet below a glass plate can move the pins placed on it.
(10) Electric field lines and magnetic field lines are similar in some properties.
(11) The mutual force between two like charges is similar to the mutual force between two like poles of magnets.

7-Compare between each of the following:

(1) Electric field and magnetic field.
(2) Electric field lines and magnetic field lines.

8-What happens when:

From the beginning of the lesson until the law of attraction and repulsion

(1) A magnet is divided into several parts
(2) A magnet is brought close to a mixture of gold and steel fillings
(3) A magnetic brush is brought close to iron filings and then passed over a surface with unclear fingerprints.
(4) A magnet is dipped in nickel filings
(5) A bar magnet is suspended freely,
(6) An aluminum rod is brought close to a stable computer

From the law of attraction and repulsion until the end of the lesson

(7) The south pole of a magnet is brought close to that pole of another freely-suspended magnet
(8) The north pole of a magnet is brought close to that pole of another freely-suspended magnet

Lesson (3) Gravitational force

Classification of the Forces

Types of forces

Field Forces	Contact Forces
The objects found within their fields)	(They do not have fields)
such as -Electrostatic forces (Static electricity) -Magnetic forces -Gravitational forces	such as -Collision forces -Friction forces -Elasticity forces

G.R. Gravitational, electric and magnetic forces have fields, while frictional forces do not.

القوى الجاذبية والكهربائية والمغناطيسية لها مجالات، بينما قوى الاحتكاك لا.

Because gravitational, electric and magnetic forces act on objects at a distance without contact, while frictional forces are considered contact forces.

لأن القوى الجاذبية والكهربائية والمغناطيسية تؤثر على الأجسام على مسافة دون تلامس، في حين تعتبر قوى الاحتكاك قوى تلامس.

Gravitational Forces قوى الجاذبية

Isaac Newton Discovered that all objects attract each other

اكتشف إسحاق نيوتن أن جميع الأجسام تجذب بعضها البعض،

The unit of force (Newton) was named after him

سميت وحدة القوة (نيوتن) باسمه

►**The Earth's gravitational force** causes all objects to fall downwards in the direction of the Earth's center.

تتسبب قوة جاذبية الأرض في سقوط جميع الأجسام إلى الأسفل في اتجاه مركز الأرض

►**The effect of Earth's gravitational force** on material objects within the space surrounding the Earth is referred to as the Earth's gravitational field.

يُشار إلى تأثير قوة جاذبية الأرض على الأجسام المادية داخل الفضاء المحيط بالأرض باسم مجال جاذبية الأرض

The Earth's gravitational force is represented by lines called Earth's gravitational field lines, which indicate the direction of the gravitational force acting on an object placed in its field.

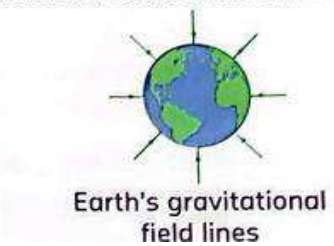
قوة الجاذبية الأرضية ممثلة بخطوط تسمى خطوط مجال الجاذبية الأرضية، والتي تشير إلى اتجاه قوة الجاذبية المؤثرة على جسم موضوع في مجالها.

Gravitational force effect on the objects

Earth's Gravitational Force

Pulls (attracts) all objects downward towards the center of the Earth.

قوة الجاذبية الأرضية تسحب (تجذب) جميع الأجسام إلى الأسفل باتجاه مركز الأرض.



Earth's gravitational field lines

Earth's Gravitational Field, مجال الجاذبية الأرضية

The space in which the Earth's gravitational force affects material objects, with an attraction force towards the center of the Earth.

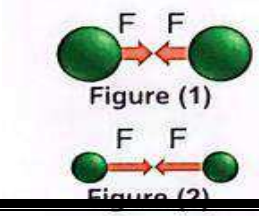
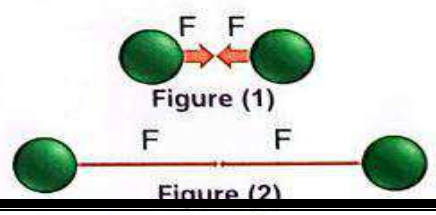
الفضاء الذي تؤثر فيه قوة الجاذبية الأرضية على الأجسام المادية، بقوة جذب باتجاه مركز الأرض.

Earth's Gravitational Field Lines خطوط مجال الجاذبية الأرضية

Lines that represent Earth's gravitational force خطوط تمثل قوة الجاذبية الأرضية .

Gravitational force, This mutual attraction force (F) depends on:

هذه على (F) توجد قوة الجاذبية بين أي جسمين ماديين، وتعتمد قوة الجذب المتبادلة:

The Masses of The Two Objects كتلتا الجسمين	**The Distance** Between The Centers Of The Two Objects المسافة بين مركزي الجسمين
	
By increase the mass attraction Force increase بزيادة الكتلة تزداد قوة الجذب The attraction Force in greater mass Is larger than smaller mass قوة الجذب في الكتلة الأكبر تكون أكبر من الكتلة الأصغر	By decrease the distance attraction Force increase بنقصان المسافة تزداد قوة الجذب The attraction Force in in smaller distance Is larger than larger distance قوة الجذب في المسافة الأصغر تكون أكبر من المسافة الأكبر

Gravitational Force is a mutual force between two objects, acting on each of the two objects by **equal magnitude** but in **opposite directions**

قوة الجاذبية هي قوة متبادلة بين جسمين، تؤثر على كل من الجسمين بنفس المقدار ولكن في اتجاهين متعاكسين

The Gravitational force is **weak** of compared to other forces

قوة الجاذبية ضعيفة مقارنة بالقوى الأخرى.

Gravitational force is Responsible for قوة الجاذبية هي المسؤولة عن

1-The stability of the Objects, Rainfall and All the objects falling towards the Earth
ثبات الأجسام وهطول الأمطار وجميع الأجسام الساقطة نحو الأرض

3-The Phenomenon of black Holes
ظاهرة الثقوب السوداء

2- The Occurrence of the Phenomenon of Tides (Tidal phenomenon)
حدوث ظاهرة المد والجزر

4-Orbital motion
الحركة المدارية

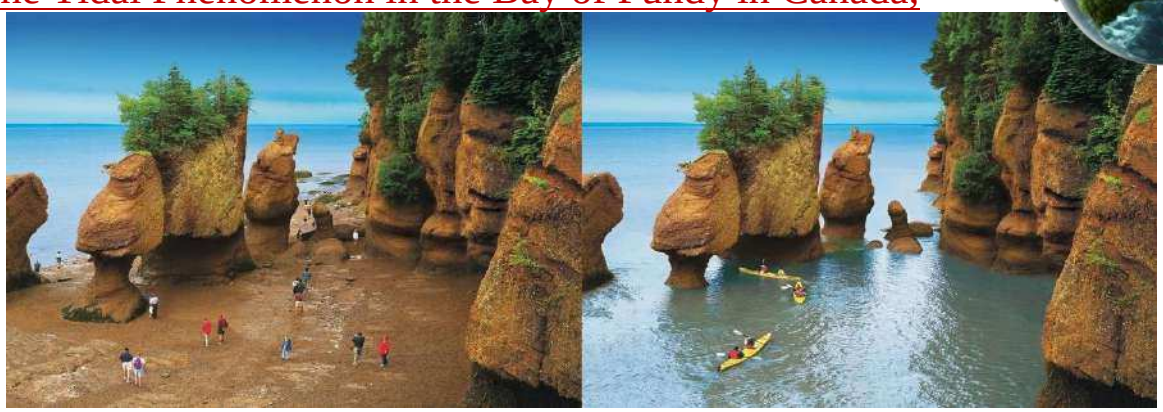
Earth's gravity keeps the stability and the positions of the objects on its surface
تحافظ جاذبية الأرض على استقرار ومواضع الأجسام على سطحها

Tidal Phenomenon ظاهرة المد والجزر

Occurs due to the gravitational attraction force between the Moon and Earth, causing periodic changes in elevation and recession of water in the seas and oceans

تحدث بسبب قوة الجذب الجاذبي بين القمر والأرض، مما يسبب تغيرات دورية في ارتفاع وانحسار المياه في البحار والمحيطات.

The Tidal Phenomenon in the Bay of Fundy in Canada,



Tides in the Bay of Fundy

Characteristics of Tides خصائص المد والجزر

1-Tides Occur Periodically and Regularly (Once Every 12 Hours)

يحدث المد والجزر بشكل دوري ومنتظم (مرة كل 12 ساعة)

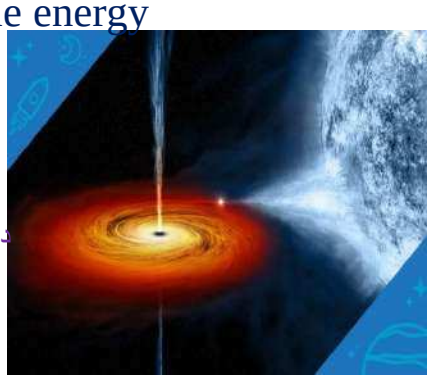
2-Tides are at their peak highest elevation of water waves) when the Moon is Either New Moon or Full Moon

2- يصل المد والجزر إلى ذروته (أعلى ارتفاع لموجات المياه) عندما يكون القمر إما محاقًا أو مكتملً(بدر)

Importance of Tides أهمية المد والجزر

1-Used to generate electricity as a source of renewable energy

يستخدم لتوليد الكهرباء كمصدر للطاقة المتجددة



2-Naturally Used to Cleanse Water Bodies (Such as the Oceans and the seas) from impurities

يستخدم بشكل طبيعي لتطهير المسطحات المائية (مثل المحيطات والبحار) من الشوائب

The role of Gravity in Black Holes دور الجاذبية في الثقوب السوداء

In the early 20th Century, The Scientists Discovered Regions in Space with great Gravity, so that even light cannot escape from them

في أوائل القرن العشرين اكتشف العلماء مناطق في الفضاء ذات جاذبية هائلة، حتى أن الضوء لا يستطيع الإفلات منها

Black Holes Regions in Space Formed due to the collapse of a massive star at the end of its life

الثقوب السوداء مناطق في الفضاء تتشكل نتيجة انهيار نجم ضخم في نهاية عمره

The Role of Gravity in Orbital Motion دور الجاذبية في الحركة المدارية

There is a gravitational attraction force between any object moving in a curved path in space around another central object (orbiting this central object).

توجد قوة جذب جاذبة بين أي جسم يتحرك في مسار منحني في الفضاء حول جسم مركزي آخر (يدور حول هذا الجسم المركزي).

The Orbital Motion الحركة المدارية

The rotation of any object in space around another central body in a curved path due to the gravitational attraction force between them

دوران أي جسم في الفضاء حول جسم مركزي آخر في مسار منحني بسبب قوة الجذب الجاذبي بينهما.

Examples of Orbital Motion

The motion of the moon around the Earth
The motion of the Earth around the Sun

The motion of the satellites around the Earth (Depends on earth's gravitational force

The electric forces	The magnetic forces	The gravitational forces
An electric charge affects on another electric charge at a distance	A magnetic pole affects another magnetic pole at a distance	A mass of one object affects the mass of another object at a distance
Can be either attractive or repulsive forces	Can be either attractive or repulsive forces	Only attractive forces
Represented by electrical field lines	Represented by magnetic field lines	Represented by gravitational field lines

The Relation between Weight and Gravity

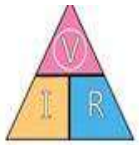
The Mass	The Weight
The amount of matter an object contains	The gravitational force that earth exerts on the object

The weight measured by using the spring balance (Newton meter), the data was recorded in the following table

Mass (kg)	1	2	3	4
Weight (N)	10	20	30	40

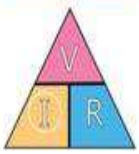
The weight of an object increases as its mass increases
يزداد وزن الجسم كلما زادت كتلته

Weight (w) = Mass (m)× Gravitational field intensity (g)
الوزن (w) = الكتلة (m) × شدة المجال الجاذبي (g)



$V = I \times R$

$R = \frac{V}{I}$



$I = \frac{V}{R}$

What is meant by The weight of an object(Earth's surface is 20 N
ما المقصود بوزن الجسم (سطح الأرض 20 نيوتن

This means that the gravitational force that earth exerts on the object equals 20 N
هذا يعني أن قوة الجاذبية التي تمارسها الأرض على الجسم تساوي 20 نيوتن

Calculate the weight of an object whose mass equals 50 kg on the Earth's surface, (Given that the Earth's gravitational field intensity = 10 N/kg)

W=?
g=10 N/kg
m=50 kg

Answer Weight (w) = Mass (m) x Gravitational field intensity (g) =50x10=500 N

Unsolved problem حلها بنفس الطريقة

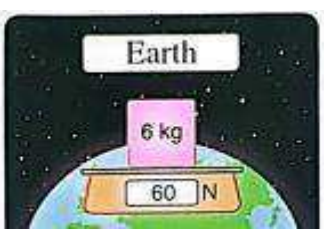
Calculate the mass of an object its weight is 245 N on the Earth's surface, knowing that the Earth's gravitational field intensity = 10 N/kg

W=..
g=….. N/kg
m=…. kg

Answer Mass(m) = ……/…… = ……/……

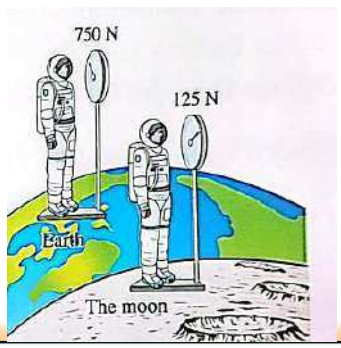
1-G.R The mass of an object remains constant and does not change from one place to another, while the weight of an object changes from one place to another.
كتلة الجسم تبقى ثابتة لا تتغير من مكان إلى آخر، بينما وزن الجسم يتغير من مكان إلى آخر

Because the mass is the amount of matter is a constant quantity does not change, while the weight changes due to the difference in the gravitational field intensity
لأن كتلة هي كمية المادة التي يحتويها، وهي كمية ثابتة لا تتغير، بينما وزن الجسم يتغير بسبب اختلاف شدة مجال الجاذبية



2- G.R The Earth's gravitational pull on objects is greater than the moon's gravitational pull on them. ?
2-قوة جاذبية الأرض على الأجسام أكبر من قوة جاذبية القمر عليها.

Because the gravitational field intensity of the moon at its surface is($\frac{1}{6}$)that of Earth's gravitational field intensity at its surface
لأن شدة مجال جاذبية القمر على سطحه تساوي شدة مجال جاذبية الأرض على سطحه



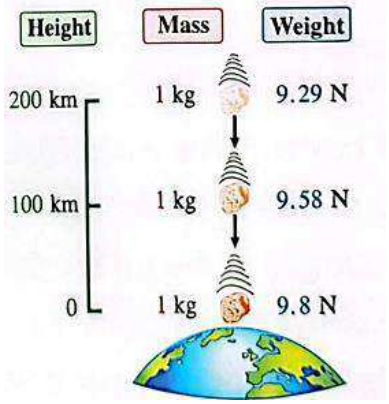
The Earth's gravitational field intensity

Decreases as you move away (upwards) from the Earth's center (by ascending above the Earth's surface)

يتناقص كلما ابتعدت (إلى أعلى) عن مركز الأرض (بالصعود فوق سطح الأرض)

Increases as you move closer (downwards) to the Earth's center (by descending towards the Earth's surface)

يزداد كلما اقتربت (إلى أسفل) من مركز الأرض (بالنزول نحو سطح الأرض)



G.R (1) The weight of an object in outer space becomes zero

Because there is no gravity the force of gravity is zero

ج.ر (1) يصبح وزن الجسم في الفضاء الخارجي صفرًا لأنه لا يوجد جاذبية قوة الجاذبية يساوي صفرًا

G.R (2) The weight of an object changes from one planet to another

Because the gravitational field intensity changes from one planet to another

ج.ر (1) يتغير وزن الجسم من كوكب إلى آخر لأن شدة مجال الجاذبية تتغير من كوكب إلى آخر

Compare between? Mass and weight

	Mass (m)	Weight (w)
Definition	The amount of matter the object contains	The gravitational force that earth exerts on the object
Measuring unit	kilograms (kg)	Newtons (N)
Mathematical law	$(m) = \frac{w}{g}$	$w = m \times g$
Change in magnitude with changing object's position	Its magnitude does not change with changing object's position remains constant	Its magnitude changes with changing body's position from one place to another

The mass of an object on the moon's surface is 30 kg, Calculate its weight on

(1) The earth's surface

(2) The moon's surface (Knowing that the Earth's gravitational field intensity = 10 N/kg)

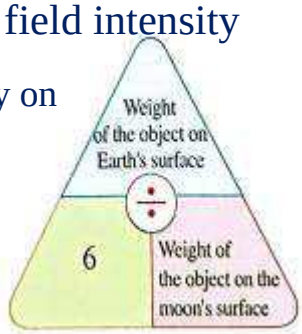
Answer (1) Weight (w) = Mass (m) x Earth's gravitational field intensity (g)

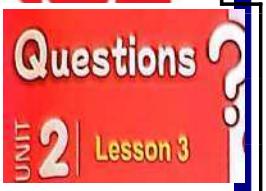
= 30x10=300 N

Moon's gravitational field intensity $= \frac{1}{6}$ x Earth's gravitational field intensity

Weight of the object on Moon's surface $= \frac{1}{6}$ x Weight of the body on Earth's surface

$= \frac{1}{6}$ x 300 = 50 N





Unit (2) Lesson (3)

1-Write the scientific term for each of the following

Classification of Forces

1-Forces that act on objects when they are in contact with each other
2-Forces that act on objects within their field at a certain distance without contact
3-The force that pulls (attracts) all objects downward towards the Earth's center
4-The space in which the Earth's gravitational force affects material objects with an attraction force towards the Earth's center
5-The force which is responsible for the stability of the objects and rainfall on the surface of the earth
6-Lines that represent the Earth's gravitational force
7-A natural phenomenon that occurs due to the gravitational force between the moon and the Earth
8-Regions in the space formed due to the collapse of a massive star at the end of its life
9-Regions in the space with immense gravity, So that even light cannot escape from them
10-The rotation of any object in space around another central object in a curved path due to the gravitational attraction force between them

The Relation Between Weight and Gravity

11-The amount of matter an object contains
12-The gravitational force that Earth exerts on the object

2-Complete the following sentences

Classification of Forces

1-Forces acting on objects are generally classified Into …..and …..forces
2-Both…….,……. and…….. are contact forces
3-Friction forces are ……forces, while gravitational force is …….. force
4-The scientist discovered that all material objects in the universe attract each other, and in recognition of his contributions, the unit of force…… was named after him.
5-The mutual gravitational forces between any two material objects depend on bath …….and…….
6-The gravitational force between two objects acts on each of the two objects by equal …….but in……. directions

Mr: Alifaz.N. Tadrous
01005136959- 01222978682

D.M.RAZK موقع الدكتور محمد رزق معلم الكيمياء التعليمي

7-Tides are at their peak when the moon is…….. or……..
8-Tides are used to generate ……. as a ……..energy source
9-An example of orbital motion is the movement of……..around …….
10- Black holes in the space are characterized by immense …… that even ……cannot escape from them
11-The weakest field force in any atom is the gravitational force between …….and…….

The Relation between Weight and Gravity

12-The…….. of an objects does not change from one place to another, while the …….of an objects changes from one place to another
13-Mass is measured in …….while weight is measured in…….
14-The weights of objects become zero in ……while their ……. remains constant

3-Choose the correct answer

Classification of Forces

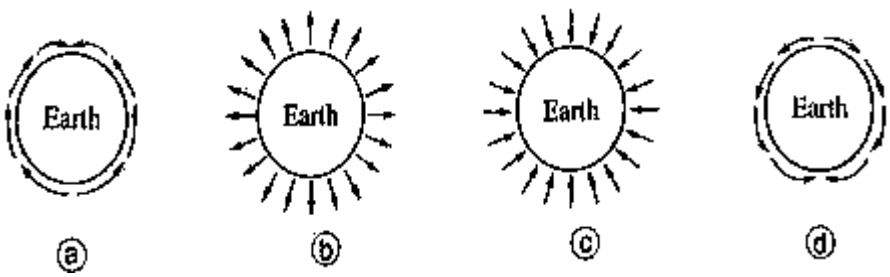
1-Which of the following forces are field forces

a. Magnetic and electrostatic forces b. Elasticity and collision forces
c. Gravitational and friction forces d. Magnetic and elasticity forces

2-The force that attracts all objects downward towards the Earth's center is a (an)…. force

a. contact b. field c. electrostatic d. magnetic

3-Which of the following figures represents Earth's gravitational field lines



4-The gravitational force between two objects decreases as

a. their masses decrease and the distance between their centers Increases
b. their masses increase and the distance between their centers decreases
c. their masses increase and the distance between their centers increases
d. their masses decrease and the distance between their centers decreases

5-Which of the following figures represents the direction of the mutual force between two material objects

6-All the following describe the importance of gravitational force, except that it is responsible for

a. stability of the objects on Earth's surface
b. causing rainfall on the Earth's surface
c. causing the phenomenon of tides
d. reducing the friction between two objects

7-The phenomenon of tides occurs……. daily

a. once b. twice c. three times d. four times

8-The phenomenon of tides is a result of the gravitational force between

a. the Earth and the moon b. the Earth and the Sun
c. the Sun and the moon d. the Earth and water

9-Black holes in the space are usually formed when

a. a massive star collapses at the end of its life
b. a planet expands at the beginning of its life
c. a massive star freezes at the end of its life
d. a planet collapses at the end of its life

10-Which of the following scientific facts applies to the field forces of $_{3}Li^{7}$ atom

a. There are repulsive electrostatic forces between the nucleus and the electrons
b. There are attractive electrostatic forces among the three electrons
c. There are gravitational forces between the nucleus and the electrons, which are very weak
d. There are gravitational forces between the nucleus and the electrons, which are very strong

11-Which of the following choices describes the gravitational force and the electrostatic forces between two non-contact material objects, both charged with positive charges

Choices	Gravitational force	Electrostatic forces
a	Attraction	Attraction
b	Repulsion	Repulsion
c	Repulsion	Attraction
d	Attraction	Repulsion

The Relation Between Weight and Gravity

12-The weight of an object on Earth's surface is always……. its mass

a. less than b. equal to c. greater than d. zer

13-If an object's mass at Earth's surface is 10 kg, then its mass in outer space is

a. 0 b. 10 kg c. 100 kg d. 0.1 kg

14-What happens when the gravitational field intensity acting on an object increases

a. Its weight increases and its mass decreases
b. Its weight decreases and its mass increases
c. Its weight increases only d. Its weight decreases only

15-The gravitational field intensity of the moon equal

a. $\frac{1}{6.}$ of the gravitational field intensity of the Sun

b. $\frac{1}{6.}$ of the gravitational field intensity of the Earth

c. six times the gravitational field intensity of the Sun

d. six times the gravitational field intensity of the Earth

16-An object weighs 320 N at the surface of a planet and weighs 800 N at Earth's surface

What is the gravitational field intensity of this planet

(knowing that the Earth's gravitational field intensity = 10 N/kg)

a. 4 N/kg b. 10 N/kg c. 32 N/kg d. 480 N/kg

4-Give one example for each of the following

1-Contact forces

2-Field forces

3-Orbital motion

5-Choose from column (B) what suit It in column (A)

(A)	(B)
1-Kilogram	a. Unit of force measurement
2-Newton/kg	b. Unit of distance measurement
3-Newton	c. Unit of electric charge measurement
4-Coulomb	d. Unit of gravitational field intensity measurement
	e. Unit of mass measurement

6-Mark() next to the correct statement, and correct the incorrect one

Classification of Forces

1-Elasticity forces are field forces, while collision forces are contact forces( )

2-Gravitational force exists between the Earth and material objects on its surface only ( )

3-Tides occur once every 24 hours( )

4-Tides are at their peak when the moon is in the crescent phase ( )

The Relation Between Weight and Gravity

5-The larger the mass of an object, the greater its weight

6-The moon's gravitational pull on an object is greater than Earth's pull on it( )

7-An object weight increases as it rises above Earth's surface ( )

8-An object whose mass is 50 kg weighs 100 N at Earth's surface ( )

9-An object weight on the moon is greater than its weight on Earth ( )

10-An object weight on Earth differs from its weight on Jupiter ( )

7-Correct the underlined words

Classification of Forces

1-The force that acts on a skier causing him to descend from the top of a sand dune towards the Earth is the friction force with the fine sand

2-The direction of Earth's gravitational force is towards Earth's surface

3-The gravitational force between two spherical objects acts with the same magnitude on both objects in the same direction

4-Tides occur in the Bay of Fundy, in Canada, four times daily

5-Black holes in the space are usually formed when a massive star freezes at the end of its life

6-Spiral motion occurs due to the gravitational force between an object orbiting in a curved path in space around another central object

The Relation Between Weight and Gravity

7-The moon's gravitational pull on an object at its surface is six times Earth's gravitational pull on it at Earth's surface

8-An object weight changes from one planet to another due to changes in its mass

9-An object weight at the base of a mountain equals its weight at the top of it

8-Mention one Importance of each of the following

1-Earth's gravitational force

2-The gravitational attraction between the moon and the earth

3-Phenomenon of tides

4-Spring balance (Newton meter)

9-Give reasons for each the following

Classification of Forces

1-Gravitational, electrostatic and magnetic forces have fields, while friction forces do not

……

2-Collision forces are contact forces, while Earth's gravitational force is a field force

……

3-The rainfall and the falling of the objects towards the Earth

……

4-The occurrence of tides phenomenon in the seas and oceans

……

5-The state of the sea differs when the moon is in the crescent phase compared to its state during the new moon and full moon phases

……

6-The formation of black holes in the space

……

7-The moon's orbital motion around the earth

……

The Relation Between Weight and Gravity

8- The concept of mass differs from the concept of weight

……

9-An object's mass does not change from one place to another, while its weight changes from one place to another

……

10-An object's weight on the Moon is less than its weight on Earth

……

11-An object's weight decreases as we move away from Earth's surface

……

12-An object's weight becomes zero in outer space

……

13An object's weight changes from one planet to another

……

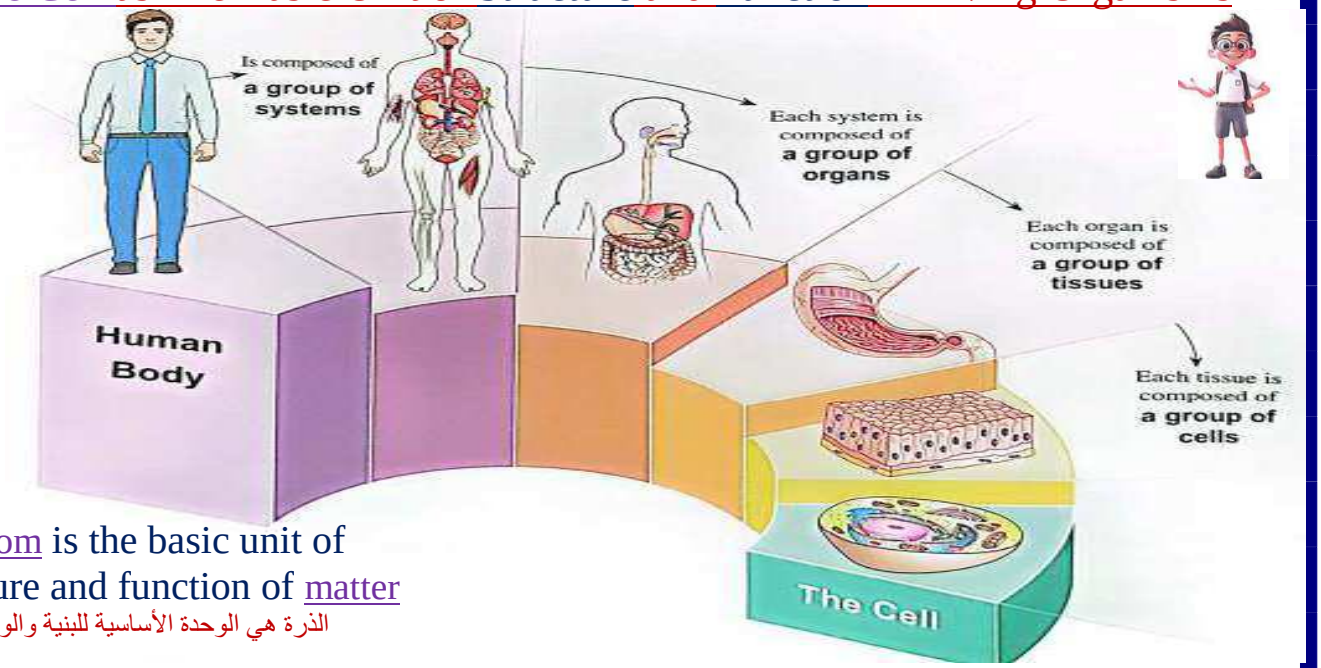
14-An object's weight on Earth's surface is always greater than its mass

……

Unit (3) Living Organisms, Their Structure and Processes

Lesson (1) Cells and Life

The Cell as The Basic Unit of Structure and Function in Living Organisms


Is composed of a group of systems
Each system is composed of a group of organs
Each organ is composed of a group of tissues
Each tissue is composed of a group of cells
Human Body
The Cell

The atom is the basic unit of structure and function of matter

الذرة هي الوحدة الأساسية للبنية والوظيفة للمادة

Similar Cells → form → Tissues → form → Organs → form → Systems → form → The body

The cell الخلية

It is the basic unit of structure and function in any living organism

هي الوحدة الأساسية للبنية والوظيفة في أي كائن حي

Classification of Living Organisms

تصنيف الكائنات الحية

Classification The arrangement of living organisms into groups based on their similarities and facilitates their study and identification

ترتيب الكائنات الحية في مجموعات على أساس التشابه بينها وتسهيل دراستها وتحديد هويتها

Living Organisms Classified according to تصنيف الكائنات الحية حسب

The number of cells		Structure of the nucleus	
Unicellular	Multicellular	Prokaryotes	Eukaryotes

First Unicellular and Multicellular Organisms

1-Unicellular Organisms

-Their body consists of a single cell, so they are called unicellular organisms

- يتكون جسمها من خلية واحدة، لذلك تسمى كائنات وحيدة الخلية

-Unspecialized, meaning that the cell performs all vital processes necessary for life

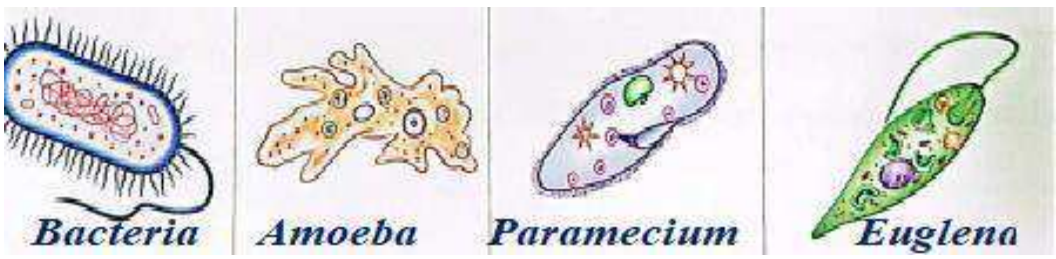
- غير متخصصة، أي أن الخلية تقوم بجميع العمليات الحيوية الضرورية للحياة

They cannot be seen by the naked eye, but can be observed under a light microscope, so called microscopic organisms

لا يمكن رؤيتها بالعين المجردة، ولكن يمكن ملاحظتها تحت المجهر الضوئي، لذلك تسمى كائنات مجهرية

Ex Yeast fungus Bacteria Euglena

Protozoa such as Amoeba and Paramecium



G.R. Bacteria, Amoeba and Paramecium are classified as microscopic organisms?

تُصنف البكتيريا والأميبا والبراميسيوم ضمن الكائنات الحية المجهرية،

Because they are unicellular organisms that cannot be seen by the naked eye,

وذلك لأنها كائنات وحيدة الخلية لا يمكن رؤيتها بالعين المجردة

2-Multicellular Organisms الكائنات الحية متعددة الخلايا-

1-Their body consist of many cells, so they are called multicellular organisms_

يتكون جسمها من العديد من الخلايا لذلك تسمى بالكائنات متعددة الخلايا

2-Their cells are differentiated, meaning that they vary in their shape and structure

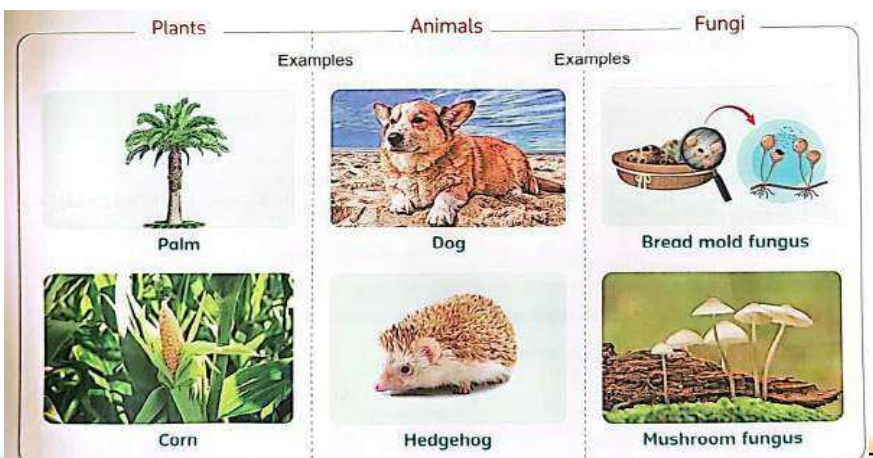
- خلاياها متمايزة أي أنها تختلف في شكلها وبنيتها

3-Their cells are specialized in their function, meaning that each group of cells performs specific vital processes

*- خلاياها متخصصة في وظيفتها أي أن كل مجموعة من الخلايا تقوم بعمليات حيوية محددة

4- large in size and can be seen by the naked eye كبيرة الحجم ويمكن رؤيتها بالعين المجردة

Plants.Animals Fungi, such as: Bread mold fungus and Mushroom fungus



. G.R. Human cells are differentiated and specialized? الخلايا البشرية متمايزة ومتخصصة

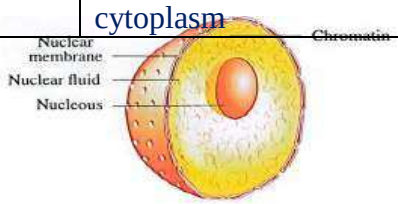
Because they different in their shape and structure, and specialized because each group of cells performs specific vital processes

لأنها تختلف في شكلها وتركيبها ، ومتخصصة لأن كل مجموعة من الخلايا تؤدي عمليات حيوية محددة.

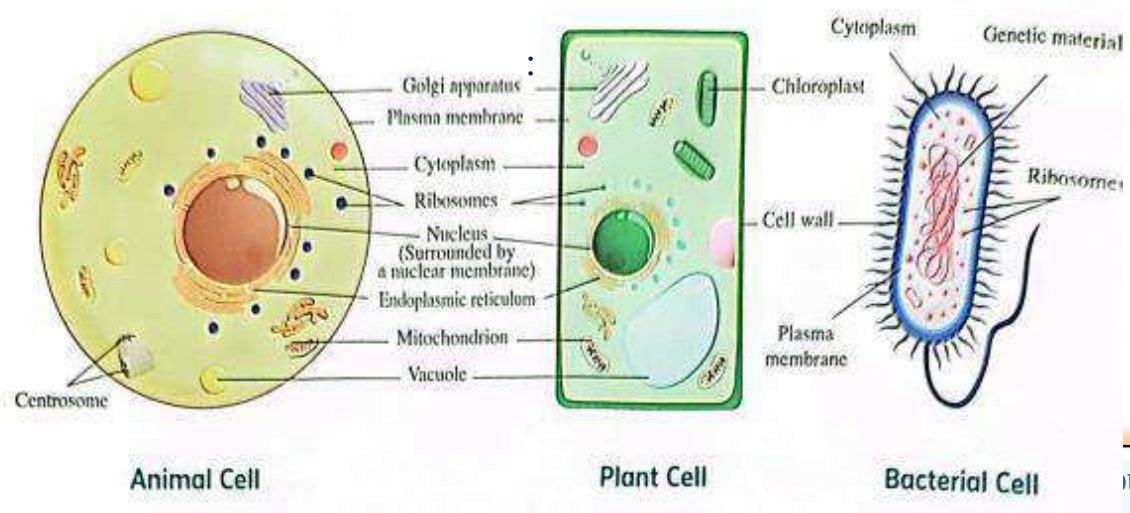
Second Prokaryotes and Eukaryotes

Prokaryotes اوليات النواة	Eukaryotes حقيقيات النواة
Living organisms characterized by the following characteristics	
-All are unicellular -Simple in structure - Relatively small in size - Their genetic material in the cell is found in the cytoplasm and not surrounded by a nuclear membrane - Many cell organelles are missing	-They may be unicellular or multicellular - Their body is more complex - Relatively large in size - Their genetic material in the call is surrounded by a nuclear membrane, separating it from the cytoplasm (True nucleus) - They contain many cell organelles
Ex. Bacteria	-Examples -Yeast fungus and Euglena. Protozoa such as Amoeba and Paramecium (unicellular organisms) Plants like beans and animals - Fungi - bread mold fungus - mushroom fungus
G.R Bacteria are classified as prokaryotes Because their genetic material is found in the cytoplasm and not surrounded by a nuclear membrane	G.R Euglena is classified as an eukaryote Because its genetic material is surrounded by a nuclear membrane, separating it from the cytoplasm

The true nucleus is composed of
-Nuclear membrane
-Nucleolus
-Nuclear fluid
-Chromatin (The genetic material)



The structure of a bacterial cell (Prokaryote), a plant cell and an animal cell (Eukaryotes)



From the previous table, we conclude that

The bacterial, animal and plant cells all share the presence of

Plasma membrane (cell membrane) – Cytoplasm- Ribosomes

تشترك الخلايا البكتيرية والحيوانية والنباتية في وجود: غشاء بلازمي (غشاء خلوي) - سيتوبلازم - ريبوسومات.

The plant cell shares with the animal cell the presence of

Plasma membrane (cell membrane)- Nucleus- Cytoplasm

Cell organelles, Golgi apparatus- Ribosomes Endoplasmic reticulum Mitochondria - Vacuoles

-تشترك الخلية النباتية مع الخلية الحيوانية في وجود: غشاء بلازمي (غشاء خلوي) - نواة - سيتوبلازم. عضيات خلوية، مثل جهاز جولجي - ريبوسومات- ميتوكوندريا - فجوات عصارية.

The plant cell-Cell wall -Chloroplasts -Large vacuole

الخلية النباتية: وجود جدار خلوي. - بلاستيدات خضراء- فجوة عصارية. كبيرة

The animal cell Centrosome - Small vacuoles

الخلية الحيوانية وجود- جسيم مركزي - فجوات عصارية صغيرة.

	Unicellular organisms	Multicellular organisms
Body structure	single (one) cell	Many cells
specialization	Unspecialized	Specialized
Size	Microscopic, cannot be seen by the naked eye, but can be observed under a light microscope	Relatively large in size, and can be seen by the naked eye
Nuclear structure	Prokaryotic	Eukaryotic
Examples	-Yeast fungus- Bacteria -Protozoa such as Amoeba and Paramecium-Euglena	- Plants -Animals - Bread mold fungus -Mushroom fungus

Prokaryotes and Eukaryotes

	Prokaryotes	Eukaryotes
Body structure	All are unicellular	May be unicellular or multicellular
Body complexity	Simple structure	More complex
Size	Relatively small in size	Relatively large in size
Genetic material	In the cytoplasm, not surrounded by a nuclear membrane	Surrounded by a nuclear membrane separating it from the cytoplasm
Cell organelles	Many organelles are missing	Contain many organelles
Examples	Bacteria	Fungi such as yeast fungus, bread mold fungus and mushroom fungus Protozoa such as Amoeba and Paramecium Euglena Plants. Animals

Stem Cells الخلايا الجذعية

When you visit the pottery village in Fustat city, you will find various pottery artefacts created by the Egyptian artists from clay

عند زيارتك لقرية الفخار في مدينة **الفسطاط** ستجد العديد من المصنوعات الفخارية التي صنعها الفنانون المصريون من الطين

Stem Cells الخلايا الجذعية

Undifferentiated cells that have the ability to be transformed and differentiated into all the differentiated cells of the body, that perform a specialized functions

خلايا غير متمايزة لها القدرة على التحول والتمايز إلى جميع الخلايا المتمايزة في الجسم، والتي تقوم بوظائف متخصصة

Stem Cells in Human الخلايا الجذعية في الإنسان

Examples of some specialized cells resulting from the transformation of stem cells in human.

يوضح الشكل المقابل أمثلة لبعض الخلايا المتخصصة الناتجة عن تحول الخلايا الجذعية في الإنسان

It's characteristics خصائصها

1-Their ability to renew themselves through division and produce more stem cells

1- قدرتها على تجديد نفسها من خلال الانقسام وإنتاج المزيد من الخلايا الجذعية

2-Their ability to differentiate into specialized types of cells found in the body

2- قدرتها على التمايز إلى أنواع متخصصة من الخلايا الموجودة في الجسم

Note The function of the cell differs depending on its structure. For example, the composition of muscular tissue from long muscle cells (fiber) allows it to perform the functions of contraction and relaxation

تختلف وظيفة الخلية حسب بنيتها، فمثلاً تركيب الأنسجة العضلية من خلايا عضلية طويلة (ألياف) يسمح لها بأداء وظيفتي الانقباض والاسترخاء.

Medical Applications التطبيقات الطبية

1- Understanding of how diseases occur, by observing cell differentiation,

فهم كيفية حدوث الأمراض، من خلال ملاحظة تمايز الخلايا

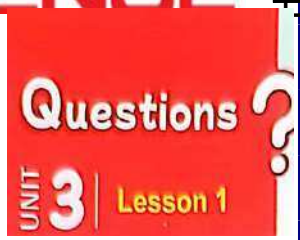
2-Generate healthy cells to replace cells infected by disease

توليد خلايا سليمة لتحل محل الخلايا المصابة بالمرض.

Test new drugs before use to determine their safety and effectiveness, where stem cells are grown in the laboratory and treated them with the tested drug

اختبار الأدوية الجديدة قبل استخدامها لتحديد سلامتها وفعاليتها، حيث يتم زراعة الخلايا الجذعية في المختبر ومعالجتها بالدواء المختبر.

Unit (3) Lesson (1)



1-Write the scientific term for each of the following

From the beginning of the lesson to just before prokaryotes

1-The smallest structural unit in the human body (……..)
2-The building units that are directly above tissues (……..)
3-The building units that precede organs (……..)
4-The classification of living organisms into groups based on their similarities and differences (……..)
5-Microorganisms whose bodies are made of a single, unspecialized cell and cannot be seen by the naked eye (……..)
6-Living organisms whose bodies are formed of differentiated and specialized cells (……..)
7-A device used to examine microorganisms (……..)

From prokaryotes until the end of the lesson

8-Microorganisms whose genetic material is not surrounded by a nuclear membrane (……..)
9-Living organisms with more complex bodies and whose genetic material is surrounded by a nuclear membrane (……..)
10-Cell organelles shared by both prokaryotic and eukaryotic cells(……..)
11-A cellular structure found only in both bacterial and plant cells(……..)
12-Unique organelles found in plant cells only (……..)
13-A cell organelle that distinguishes an animal cells from a plant cells(……..)
14-A cell organelle that is larger in size in a plant cell compared to animal cell (……..)
15-Undifferentiated cells that have the ability to be transformed into differentiated cells, that perform specialized function(……..)
16-Undifferentiated cells with the ability to continuously renew themselves in human (……..)

2-Choose the correct answer

From the beginning of the lesson to just before prokaryotes

1-The body of a lion consists of a group of
a. systems b. organs c. tissues d. cells
2-The heart is considered
a. a cell b. an organ c. a tissues d. a system
3-The building units that form an organ are called ……
a. systems b. tissues c. cells. d. organelles
4-The building units that form a tissue are called …….
a. organelles b. systems c. cells. d. organs
5-Amoeba is distinguished from bacteria in that it is
a. eukaryote b. unicellular

c. can be seen under a light microscope d. unspecialized

6- A cell that performs all vital processes is described as

a. differentiated b. undifferentiated c. specialized d. unspecialized

7-All the following are classified as microorganisms, except

a. Amoeba b. Euglena c. Paramecium d. Bread mold fungus

8-All the following organisms have specialized cells, except

a. beans b. yeast c. corn d. elephant

From prokaryotes until the end of the lesson

9-All the following from characteristics of prokaryotes, except

a. most are unicellular b. organisms simple in their structure

c. relatively small in size

d. their genetic material is not surrounded by a nuclear membrane

10-Which of the following living organisms lack most organelles in their cells

a. Amoeba b. Euglena c. Paramecium d. Bacteria

11- Yeast fungus and bread mold fungus share the characteristic that both are

a. eukaryote b. unicellular c. prokaryote d. relatively large in size

12-All the following living organisms, their genetic material surrounded by a nuclear membrane, except

a. bacteria b. Euglena c. yeast fungus. D. bean plant

13-All the following are characteristics of Paramecium, except it is

a. a unicellular prokaryote b. a unicellular eukaryote

c. a protozoan d. a microscopic organism

14-Which of the following is found in animal, plant and bacterial cells

a. Centrosome b. Ribosomes c. Nucleus d. Chloroplasts

15- All the following are present in bacterial cell, except

a. ribosomes b. Golgi apparatus plasma membrane cytoplasm

16- The cell wall is found in

a. plant cell only b. animal cell only

c. plant and bacterial cells d. animal and bacterial cells

17-Both plant and animal cells are characterized by the presence of

a. plasma membrane and centrosome b. plasma membrane and cytoplasm

c. cell wall and nucleus d. cell wall and cytoplasm

18-From the following table

Points of comparison	A muscle cell	A cell of plant leaf
1	Has a cell wall	Has no cell wall
2	Genetic material is found in the nucleus	Genetic material is found in the nucleus
3	Contains cytoplasm	Does not contain cytoplasm
4	Does not contains chloroplasts	contains chloroplasts

Which the points of comparison is correct

a. (1)only b. (2)and (3) only c. (2)and (4) only d. (4) only

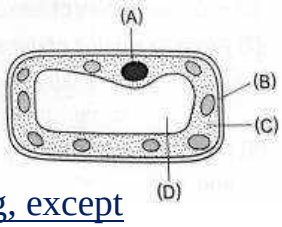
19-The centrosome is present in

a. bacterial cell only b. animal cell only

c. plant and bacterial cells d. bacterial and animal cells

20-In the opposite figure

Which part contains the genetic material



a. (A) b. (B)

c. (C) d. (D)

21-Stem cells studies can assist in all the following, except

a. increasing the understanding of how diseases occur.)

b. generating healthy cells to replace cells infected by disease

c. determining the shape of stem cells

d. testing new drugs before using them

3-Choose from column (B) what suits it in column (A)

(A)	(B)
Living organism	Characteristics
1-Bacteria	a. Unicellular organisms whose genetic material is surrounded by a nuclear membrane
2-Yeast fungus	b. Organisms composed of many differentiated and specialized cells
3-Bean plant	c. Unicellular organisms whose genetic material is located in the cytoplasm
	d. Multicellular organisms lacking many organelles

4-Complete the following statements with what is suit from the following living organisms

Bread mold fungus -Palm trees -Bacteria -Yeast fungus- Paramecium

1-……..from unicellular prokaryotes

2-……..from unicellular eukaryotic protozoa

3-……..from unicellular fungi

4-……from multicellular fungi

5-Give an example of each of the following

From the beginning of the lesson to just before prokaryotes

1-A unicellular organism

2-A multicellular organism

From prokaryotes until the end of the lesson

3- A unicellular prokaryote

4- A unicellular eukaryote

5- A multicellular eukaryote

6-A unicellular eukaryotic fungus

7- A multicellular eukaryotic fungus

6-Classify the following living organisms based on what you have studied

1-Paramecium
2-Euglena
3-Yeast fungus
4-Bread mold fungus
5-Lily plant
6-Palm tree
7-Dog
8-Human

7-Mark (√) or (X) for each statement, with correction

From the beginning of the lesson to just before prokaryotes

1-The tissue in the human body is similar to the atom in the structure of matter ( )
2-All living organisms' bodies consist of systems ( )
3-All living organisms share the same basic unit of structure and function ( )
4-Euglena belongs to the protozoa ( )
5-Bacterial cells are unspecialized ( )
6-Bean plant cells are specialized and undifferentiated ( )
7-Multicellular living organisms can be seen by the naked eye ( )

From prokaryotes until the end of the lesson

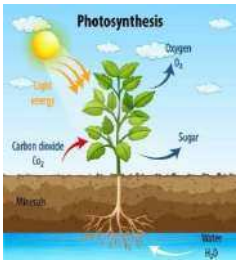
8-Bacteria contain a prokaryotic nucleus, while bread mold fungus contains an eukaryotic nucleus ( )
9-Prokaryotes are simple in structure and relatively small in size ( )
10-Yeast fungus contains genetic material found in the cytoplasm ( )
11-The genetic material of prokaryotes is surrounded by a nuclear membrane ( )
12-The genetic material of human cells is found in the cytoplasm ( )
13-A lion has a body composed of many specialized cells ( )
14-Bacterial cell shares with animal cell the presence of cytoplasm and a plasma membrane ( )
15-Mitochondria and vacuoles from organelles found in the cells of both corn plant and hedgehog ( )
16-Bacterial cell contains a large vacuole ( )
17-Bacterial cell differs from plant and animal cells in its nuclear structure ( )
18-Animal cell contains more vacuoles compared to that of plant cell ( )
19- Stem cells are undifferentiated cells
20- Stem cells are found in higher animals and human
21-Stem cells can divide and produce more of themselves
22-Stem cells have the ability to differentiate into specialized cells

8-Choose the odd word out, then mention the relation between the rest

1-Bacteria/Yeast / Euglena / Amoeba
2-Yeast / Bread mold/Mushroom/Bean plant
3-Paramecium/Bread mold/Lion / Date palm

D.M.RAZK موقع الدكتور محمد رزق معلم الكيمياء التعليمي

Lesson (2) General Characteristics of Living Organisms



living organisms, they all share general characteristics that distinguish them from non-living materials such as

لكائنات الحية تشترك جميعها في خصائص عامة تميزها عن المواد غير الحية، مثل

-Nutrition –Respiration- Transport –Excretion- Movement- Growth- Sensation - Reproduction –Adaptation

- التغذية - التنفس - النقل - الإخراج - الحركة - النمو - الإحساس - التكاثر - التكيف

1-Nutrition التغذية

One of the characteristics of living organisms, in which they obtains food, that represents the main source of energy, and produces substances that are used in building their body

من خصائص الكائنات الحية أنها تحصل على الغذاء الذي يمثل المصدر الرئيسي للطاقة، وينتج مواد تستخدم في بناء أجسامها

Living organisms obtain their food in different ways, they may be

تحصل الكائنات الحية على غذائها بطرق مختلفة، فقد تكون

Autotrophic organisms (Autotrophs) كائنات ذاتية التغذية	**Heterotrophic organisms** (Heterotrophs) الكائنات غير ذاتية التغذية
can make their own food through photosynthesis called (producers) in chloroplasts يمكنها صنع غذائها بنفسها من خلال عملية البناء الضوئي وتسمى كائنات منتجة في البلاستيدات الخضراء	They depend directly or indirectly on producers called (consumers) تعتمد بشكل مباشر أو غير مباشر على منتجين وتسمى كائنات مستهلكة

The Nutrition in Prokaryotes the ways may be Autotrophs- Heterotrophs

Example Bacteria Blue-green bacteria

This is a type of autotrophic bacteria that can make their own food through photosynthesis process

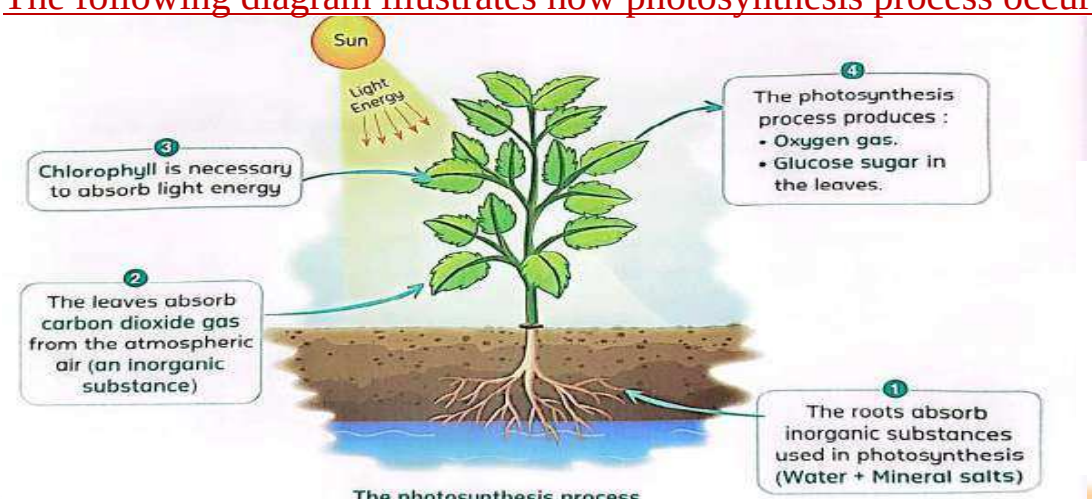
G.R. The bean plant is considered a producer

يعتبر نبات الفاصوليا من النباتات **المنتجة**

Because produces its own food through photosynthesis, in chloroplasts (chlorophyll)

لأن نبات الفاصوليا ذاتي التغذية ينتج غذائه بنفسه من خلال عملية التمثيل الضوئي والتي تحدث في البلاستيدات الكلوروفيل

The following diagram illustrates how photosynthesis process occurs *


Sun
Light Energy
3 Chlorophyll is necessary to absorb light energy
4 The photosynthesis process produces :
• Oxygen gas.
• Glucose sugar in the leaves.
2 The leaves absorb carbon dioxide gas from the atmospheric air (an inorganic substance)
1 The roots absorb inorganic substances used in photosynthesis (Water + Mineral salts)

The photosynthesis process

1-The inorganic substances used in photosynthesis are
(Water -Mineral salts -Carbon dioxide gas)
1- المواد غير العضوية المستخدمة في عملية البناء الضوئي هي(الماء - الأملاح المعدنية - غاز ثاني أكسيد الكربون)

2-The products of photosynthesis are
-Glucose (an organic substance) -Oxygen (an Inorganic substance)
2- نواتج عملية البناء الضوئي هي- الجلوكوز (مادة عضوية) - الأكسجين (مادة غير عضوية)

3-The substance responsible for absorbing light energy in plants: Chlorophyll
3- المادة المسئولة عن امتصاص الطاقة الضوئية في النباتات: الكلوروفيل

4-The substance produced by the plant as food, from which it obtains energy Glucose
4- المادة التي ينتجها النبات كغذاء ويحصل منها على الطاقة الجلوكوز

5-The equation of photosynthesis represents the conversion of light energy into stored chemical energy

Water + Carbon dioxide + Light energy ⟶ Glucose + Oxygen

5- معادلة البناء الضوئي تمثل تحويل الطاقة الضوئية إلى طاقة كيميائية مخزنة الماء + ثاني أكسيد الكربون + الطاقة الضوئية ⟵ الجلوكوز + الأكسجين

Energy and matter are two forms of the same thing, and they can be transformed into one another.

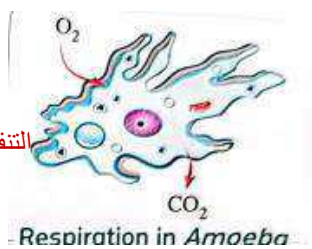
Artificial Photosynthesis- Artificial leaves that resemble green plant leaves. These leaves are supplied with hydrogen gas and absorb carbon dioxide gas emitted from cars exhausts, factories, to reduce the global warming

البناء الضوئي الاصطناعي أوراق صناعية تشبه أوراق النباتات الخضراء، تعمل هذه الأوراق على تزويد الجسم بغاز الهيدروجين، وتمتص غاز ثاني أكسيد الكربون المنبعث من عوادم السيارات والمصانع ، للحد من ظاهرة الاحتباس الحراري

2-Respiration التنفس

A process by which a living organism obtains oxygen gas directly from its surrounding environment or through a respiratory system and release carbon dioxide gas during gas exchange.

عملية يحصل بها الكائن الحي على غاز الأكسجين مباشرة من بيئته المحيطة أو من خلال جهاز تنفسي ويطلق غاز ثاني أكسيد الكربون أثناء تبادل الغازات.

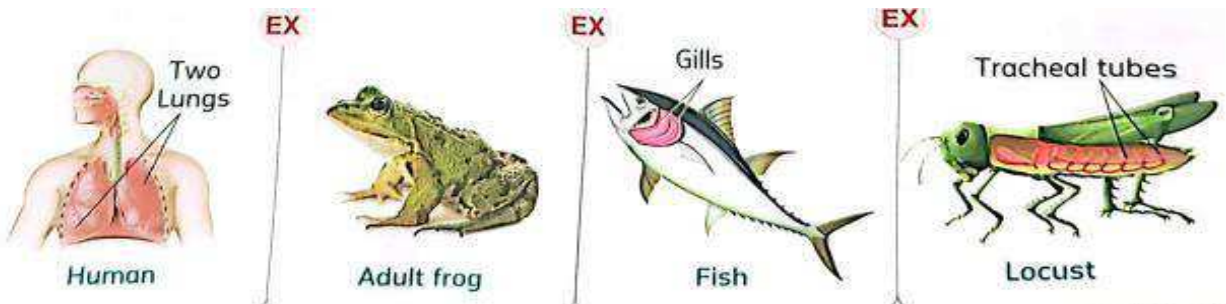


Respiration in Amoeba

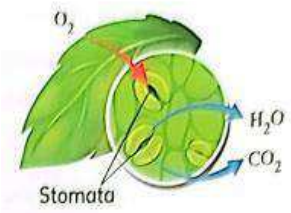
Respiration in Unicellular Organisms التنفس في الكائنات وحيدة الخلية
* obtain oxygen gas directly from their surrounding environment and release carbon dioxide gas.

تحصل الكائنات وحيدة الخلية على غاز الأكسجين مباشرة من بيئتها المحيطة وتطلق غاز ثاني أكسيد الكربون

Mammals الثدييات	Amphibians البرمائيات	Fish الأسماك	Insects الحشرات
They obtain oxygen through "Lungs تحصل على الأكسجين من الهواء "الرئتين	They obtain oxygen Lungs and skin " تحصل على الأكسجين من "الرئتين والجلد	They obtain dissolved oxygen through "Gills تحصل على الأكسجين من خلال عضو التنفس "الخياشيم	They obtain oxygen "Tracheal tubes تحصل على الأكسجين من الهواء الجوي من خلال "القصبة الهوائية



Plants



Plants do not have a specialized respiratory system, but they obtain oxygen required for respiration from the atmospheric air through natural openings on the leaves called Stomata.

النباتات
لا تمتلك النباتات جهاز تنفس متخصص، ولكنها تحصل على الأكسجين اللازم للتنفس من الهواء الجوي من خلال فتحات طبيعية في الأوراق تسمى الثغور.

Plants perform respiration continuously, throughout both the day and night

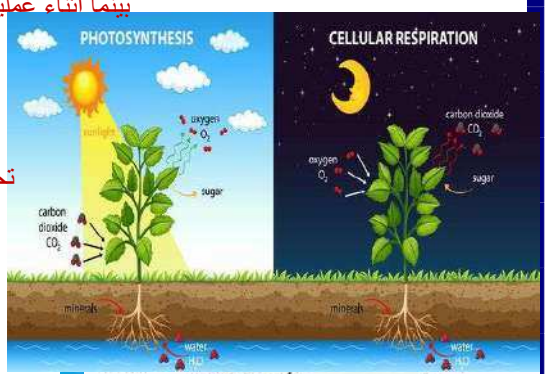
، تقوم النباتات بالتنفس بشكل مستمر، طوال النهار والليل.

G.R. Both photosynthesis and respiration processes in plant are considered opposite processes

تعتبر كل من عمليتي البناء الضوئي والتنفس في النبات عمليتين متعاكستين

Because during photosynthesis, plant absorbs carbon dioxide gas and produce oxygen gas, - while during respiration, it obtains oxygen from the atmospheric air and release carbon dioxide gas.

لأنه أثناء عملية البناء الضوئي يمتص النبات غاز ثاني أكسيد الكربون وينتج غاز الأكسجين،
بينما أثناء عملية التنفس يحصل النبات على الأكسجين من الهواء الجوي ويطلق غاز ثاني أكسيد الكربون.



Cellular respiration التنفس الخلوي

Breaking down organic nutrients, (glucose) by oxygen to release the energy

تحليل العناصر الغذائية العضوية (الجلوكوز) بواسطة الأكسجين لإطلاق الطاقةمكان حدوثها

it occurs in Mitochondria in the eukaryotic cells. When it occurs: Throughout the day and night

تحدث في الميتوكوندريا في الخلايا حقيقية النواة.: طوال اليوم والليل

The equation that represents it المعادلة التي تمثلها

Glucose + Oxygen ⟶ Water + Carbon dioxide + Energy

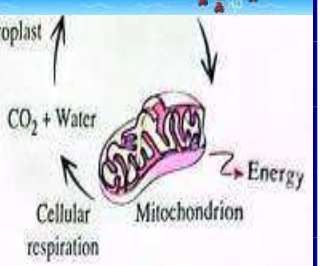
الجلوكوز + الأكسجين ⟵ الماء + ثاني أكسيد الكربون + الطاقة

What happens in the chloroplast complements what happens in the mitochondria, where

ما يحدث في البلاستيدات الخضراء يكمل ما يحدث في الميتوكوندريا، حيث

1-Chloroplasts in green plants carry out photosynthesis and produce glucose and oxygen

البلاستيدات الخضراء في النباتات الخضراء تقوم بعملية البناء الضوئي وتنتج الجلوكوز والأكسجين



The relationship between photosynthesis and cellular respiration

2-Mitochondria use glucose and oxygen to release energy during cellular respiration, producing water and carbon dioxide, which the chloroplasts reuse in photosynthesis once again

- تستخدم الميتوكوندريا الجلوكوز والأكسجين لإطلاق الطاقة أثناء التنفس الخلوي، مما ينتج الماء وثاني أكسيد الكربون، والذي تعيد البلاستيدات الخضراء استخدامه في عملية البناء الضوئي مرة أخرى

3-Transport النقل

Multicellular eukaryotic organisms have circulatory system in human and the transport system in plant

تتمتع الكائنات الحية حقيقية النواة الدورة الدموية في الإنسان ونظام النقل في النبات

A- The Circulatory System in Human Structure

it consists of three main parts, which are
Heart- Blood vessels, (Arteries Veins Blood capillaries)

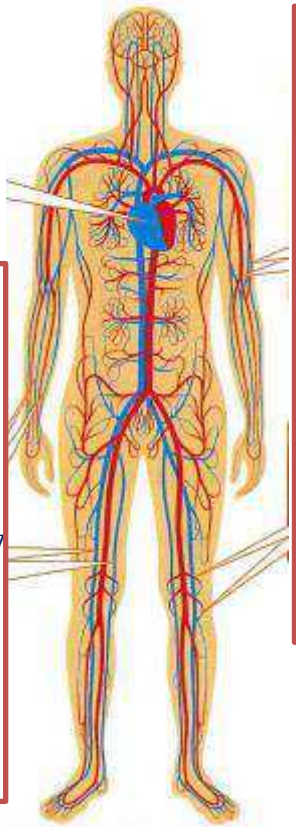
القلب Heart

- It pumps the blood to all the body parts.
- يضخ الدم إلى جميع أجزاء الجسم..

الأوردة Veins

vessels that carry the blood from all the body parts to the heart.
الأوعية التي تحمل الدم من جميع أجزاء الجسم إلى القلب

Importance Most of them carry blood containing waste products and carbon dioxide gas to the heart
. الأهمية: تحمل معظمها الدم المحتوي على الفضلات وغاز ثاني أكسيد الكربون إلى القلب



Human circulatory system

الشرايين Arteries

Description: Blood vessels that carry the blood away from the heart to all the body parts.
الوصف: الأوعية الدموية التي تحمل الدم من القلب إلى جميع أجزاء الجسم

Importance. Most of them carry blood rich in digested food and oxygen gas from the heart to all the body cells.
. الأهمية: تحمل معظمها الدم الغني بالغذاء المهضوم وغاز الأكسجين من القلب إلى جميع خلايا الجسم

The circulatory system in Human الجهاز الدوري في الإنسان

الوظيفة Function

Transport digested food and oxygen extracted from the atmospheric air through the blood.
نقل الطعام المهضوم والأكسجين المستخرج من الهواء الجوي عبر الدم.

The blood carries them to the heart, that pump them to all the cells of body, and then it returns to the heart once again in a closed cycle, described as the circulation
يحملهما الدم إلى القلب الذي يضخهما إلى جميع خلايا الجسم، ثم يعود إلى القلب مرة أخرى في دورة مغلقة، تسمى الدورة الدموية

G.R. Blood flows in the human circulatory system in a closed cycle
يتدفق الدم في الجهاز الدوري للإنسان في دورة مغلقة

Because the heart and blood vessels are connected in a continuous cycle
لأن القلب والأوعية الدموية متصلان في دورة مستمرة

No/Because food enters through the mouth and the waste products that not digested are eliminated through the anus
لا/لأن الطعام يدخل عن طريق الفم والفضلات التي لم يتم هضمها يتم التخلص منها عن طريق فتحة الشرج.

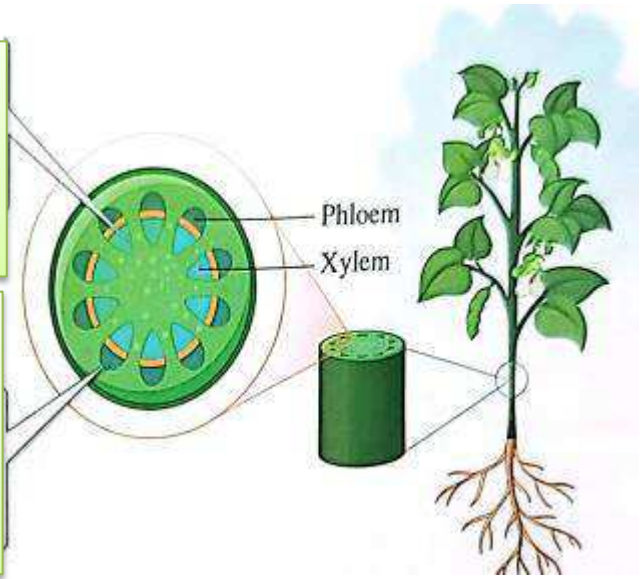
B- The Transport System in Plant

Circulation Process in Human Body Corresponds to the Process of Transport in Plants Include

1-Xylem Tissue نسيج الخشب

It Transports Water and Mineral Salts from the Roots to the leaves

يقوم بنقل الماء والأملاح المعدنية من الجذور إلى الأوراق



2- Phloem Issue اللحاء

It transfers the food produced by photosynthesis from the leaves to the rest of the plant

هو المادة التي تنقل الغذاء الناتج عن عملية البناء الضوئي من الأوراق إلى باقي أجزاء النبات

4-Excretion الإخراج

A process by which living organisms get rid of harmful waste products resulting from vital processes, as well as excess substances

عملية يتخلص بها الكائن الحي من الفضلات الضارة الناتجة عن العمليات الحيوية وكذلك المواد الزائدة

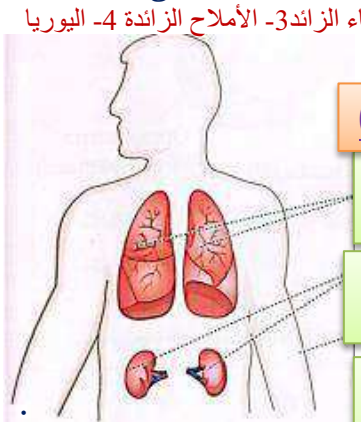
Excretion In multicellular eukaryotic organisms

الإخراج في الكائنات حقيقية النواة متعددة الخلايا

A- Excretion in Human الإخراج في الإنسان

Biological processes inside the human body produce excretory substances, including 1-Carbon dioxide gas 2-Excess water 3-Excess salts 4-Urea

تنتج العمليات البيولوجية داخل جسم الإنسان مواد إخراجية منها1- غاز ثاني أكسيد الكربون 2- الماء الزائد3- الأملاح الزائدة 4- اليوريا



:

Organ	Excretory substances	Way of elimination of it
1- The lungs	Water vapor and carbon dioxide	Exhaled air
2- The kidneys	Excess water salts and urea	In the form of urine
3- Sweat glands in the skin	Excess water salts and salt	In the form of sweat

Undigested food that leaves the body as feces is not considered an excretory substance because, scientifically, excretion is limited to substances that pass through the cell membranes of cells to leave the body

لا يعتبر الطعام غير المهضوم الذي يخرج من الجسم على شكل براز مادة إخراجية، لأن الإخراج علمياً يقتصر على المواد التي تمر عبر الأغشية الخلوية للخلايا لتخرج من الجسم

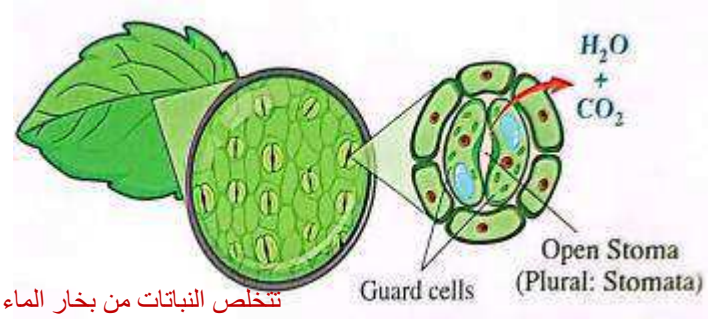
The dialysis machine is used for patients who suffer from kidney failure, This device performs the function of the kidneys through purifying the blood from the toxins

يستخدم جهاز غسيل الكلى للمرضى الذين يعانون من الفشل الكلوي، حيث يقوم هذا الجهاز بوظيفة الكلى من خلال تنقية الدم من السموم.

Dialysis machine

B- Excretion in Plants - الإخراج في النباتات

Plants eliminate excess water vapor and carbon dioxide gas through minute pores called stomata, where their opening and closing are controlled by specialized cells known .as guard cells



تتخلص النباتات من بخار الماء الزائد وغاز ثاني أكسيد الكربون من خلال مسام دقيقة تسمى الثغور، حيث يتم التحكم في فتحها وإغلاقها بواسطة خلايا متخصصة تعرف باسم الخلايا الحارسة.

Guard Cells Specialized cells that control the opening and closing of stomata in plant leaves

الخلايا الحارسة خلايا متخصصة تتحكم في فتح وإغلاق الثغور في أوراق النبات

5-Movement الحركة

The process that enables the living organism to move from one place to another

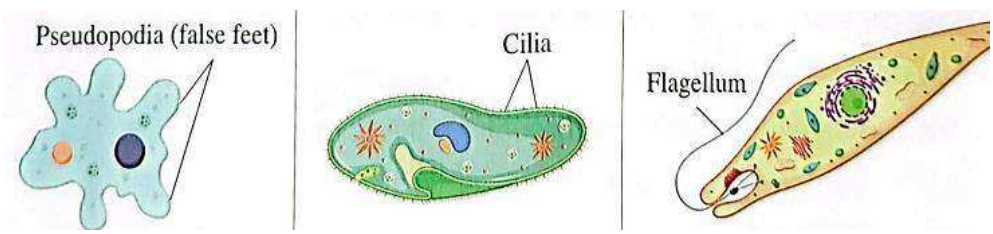
العملية التي تمكن الكائن الحي من التحرك من مكان إلى آخر

A- Movement in Unicellular Eukaryotes أ- الحركة في حقيقيات النوى وحيدة الخلية

There are various means of movement in some unicellular organisms, such as

تتعدد وسائل الحركة في بعض الكائنات وحيدة الخلية مثل

	Amoeba	Paramecium	Euglena
means of movement	Pseudopodia (false feet)	Cilia	Flagellum



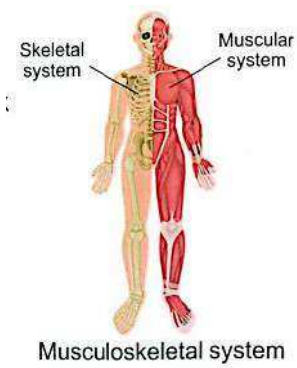
B- Movement In Multicellular Eukaryotes ب- الحركة في حقيقيات النوى متعددة الخلايا

in humans في الإنسان

Musculoskeletal System الجهاز العضلي الهيكلي

It is responsible for the movement of the human body

هو المسئول عن حركة جسم الإنسان



In the plants في النبات

Plant movement is not locomotion (movement to change the position and the location) like in animals, but it is limited and appears in several forms, such as

حركة النبات ليست حركة انتقالية (حركة لتغيير الوضع والموقع) كما في الحيوانات ولكنها محدودة وتظهر في عدة أشكال مثل

The opening of Gazania flowers during the day and closing at night

فتح أزهار الجازانيا أثناء النهار وإغلاقها ليلاً

Gazania Flower

-The drooping and folding up of Mimosa plant leaves upon touch

-انحناء أوراق نبات الميموزا وانثناءها عند لمسها

Drooping *Mimosa* plant leaves upon touch

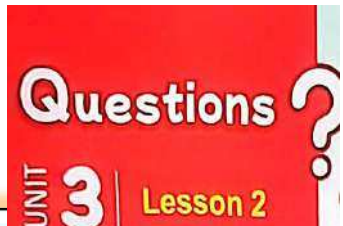
The movement of the Sunflowers to follow the movement of the sun as it rises and sets

حركة عباد الشمس لمتابعة حركة الشمس عند شروقها وغروبها

Movement of the Sunflower to follow the sun

Unit (3) Lesson (2)

1-Write the scientific term for each of the following



Mr: Ahmed N. Fadlous
01005136959- 01222978682

D.M.RAZK موقع الدكتور محمد رزق معلم الكيمياء التعليمي

From the beginning of the lesson to just before transport

1-Living organisms that can make their own food through photosynthesis ( )
2-Living organisms that depending directly or indirectly on other producers to obtain their food ( )
3-A biological process in which substances are produced that are used in building their bodies ( )
4-Organelles responsible for the occurrence of photosynthesis in plants ( )
5-The substance responsible for absorbing light energy in plants ( ) ( )
6-The substance that the plant produces as food and from which it obtains energy
7-A technological method that mimics photosynthesis to produce environmentally friendly fuel ( )
8-A phenomenon resulting from the increase in the percentage of carbon dioxide gas in the atmosphere ( )
9-The process by which a living organism obtains oxygen from the atmospheric air and gets rid of carbon dioxide gas ( )
10-The medium from which fish obtain the oxygen necessary for respiration( )
11-A group of living organisms that respire through both lungs and skin ( )
12-Structures in insects through which they obtain oxygen from the atmospheric air ( )
13-Natural openings on plant leaves that are necessary for gas exchange ( )
14-A vital process involves breaking down organic nutrients, especially glucose, in the presence of oxygen ( )
15-Organelles found in eukaryotic cells responsible for the release of energy from the organic nutrients ( )

From transport to the end of the lesson

16-A specialized system for transporting digested food and oxygen in human( )
17-Blood vessels that leave the heart, most of which carry blood rich in digested food and oxygen ( )
18-Blood vessels, most of them carry blood containing waste products and CO, gas towards the heart ( )
19-The process of transporting digested food and oxygen through the blood to the heart which pumps them to the body's cells and then return to the heart once again ( )
20-Tissue that transports food from the leaves to other parts of the plant ( )
21-A biological process in which waste products and excess substances resulting from vital processes are eliminated from the body ( )
22. Specialized cells that control the opening and closing of the stomata in plant leaves ( )
23-The process that enables the living organisms to move from one place to another ( )
24-Movement to change the position and the location ( )

2-Choose the correct answer

From the beginning of the lesson to just before transport

1-Which of the following living organisms differs in its nutrition method

a. Beans b. Humans c. Cotton d.Roses

2-All of the following are characteristics of consumers, except that they

a. obtain their food in a complex form b.depend directly on other living organisms

c. depend indirectly on other living organisms d. carry out photosynthesis

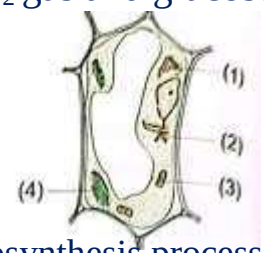
3-All of the following are common general characteristics between prokaryotes and eukaryotes, except

a. movement b. nutrition c. method, of respiration d. sensation

4-In the process of photosynthesis, which of the following do green plants use

a. CO_2 gas and water to produce energy. b.Energy to produce CO_2 gas and water. c. O_2 gas and water to produce energy. d.Energy to produce O_2 gas and glucose

5-The opposite diagram shows a plant cell. Which of the following refers to one of the cell organelles responsible for carrying out the photosynthesis process



a.(1) b.(2)

c.(3) d.(4)

6-Which of the following is absorbed by leaves during the photosynthesis process

a.O_2 gas only b. CO_2 gas only

c. CO_2 gas and light energy d. Water and O_2 gas

7-All of the following are inorganic substances used by the plant in the photosynthesis, except

a. water b. mineral salts c. CO_2 gas d. glucose

8-Which of the following is required for occurrence of artificial photosynthesis

a. Hydrogen gas only b. Nitrogen gas only

c. Hydrogen gas and CO_2 d. CO_2 gas and water

9-What is the final product of gas exchange in living organisms

a. Oxygen gas b. Carbon dioxide gas c. Hydrogen gas d. Nitrogen gas

10-Which of the following living organisms does not have a specialized respiratory system

a. Amoeba b. Tilapia fish c. Frog d. Honey bee

11-All of the following living organisms have the same respiratory organ, except

a. human and frog b. tilapia fish and mullet fish

c. locust and tilapia fish d. human and lion

12-Insects obtain oxygen from the atmospheric air through

a. Lungs b. gills c. tracheal tubes d. stomata

13- Amphibians eliminate. CO_2 gas through

a. the lungs only b. the lungs and skin c. gills d. tracheal tubes

14-Which of the following represents two opposite processes in plants

a. Nutrition and respiration b. Respiration and transport

c. Photosynthesis and nutrition d. Photosynthesis and respiration

15-What is the equation that represents inputs and outputs of cellular respiration

a. Carbon dioxide + Water + Energy → Glucose+ Oxygen

b. Oxygen +Water → - Glucose +Oxygen + Energy

c. Glucose +.Oxygen → Carbon dioxide + Water + Energy

d. Energy+ Water+ Oxygen → Glucose Carbon dioxide

From transport to the end of the lesson

16-Which of the following represents the main pump of blood in the circulation in human

a. The heart b. The arteries c. The veins d. The blood capillaries

17-Which of the following substances is carried by the blood passing through most arteries to reach the body's cells

a. Digested food only b. Oxygen gas only

c. Digested food and waste products d. Digested food and oxygen gas

18-How many types of blood vessels are included in the human circulatory system

a. One type b. Two types c. Three types d.Four types

19-Which of the following represents a closed cycle

a. The movement of food inside the human digestive system

b. The movement of water and mineral salts from the plant's roots to the leaves

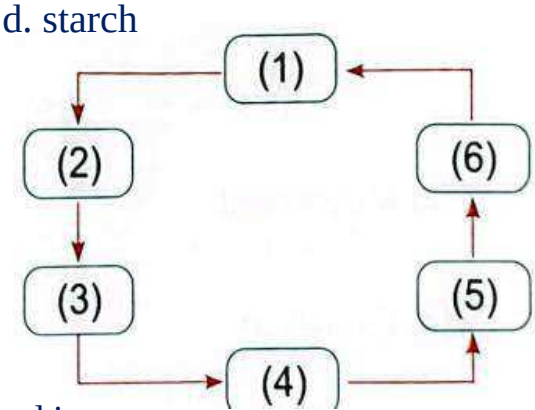
c. The movement of blood inside blood vessels and the heart in human

d. The movement of food from the leaves to the other parts of the plant

20-All the following substances are transported through transport tissues in plants, except

a. Water b. mineral salts. c. glucose d. starch

21- From the opposite diagram representing the closed blood circulation in human, which of the following is correct, starting with structure (1)



a. (1)Heart (3) Blood capillaries(5) Veins

b. (1) Arteries (5) Blood capillaries (5) Heart

c. (1)Heart (4) Body cells (6) Veins

d. (2) Veins (3) Body cells (4) Arteries

22-Which of the following excretory organs are shared in excreting excess water and salts from the human body

a. The lungs and kidneys b. Sweat glands, kidneys and lungs

c. The lungs and sweat glands d. The kidneys and sweat glands

23-Which of the following substances is excreted from the human body through only one organ without the other organs participate in its excretion

a. Water b. Urea c. Mineral salts d. Carbon dioxide

24-All the following are excretory substances, except

a. CO_2 b. nitrogen c. water d. urea

25- Which of the following plants has leaves that droop and fold up upon touch

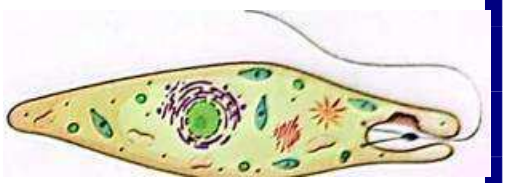
a. Gazania b. Mimosa 5. Sunflower d. Rose plant

26- Which of the following is true for both stomata and gills

a) Both allow gas exchange b. Both transport food substances

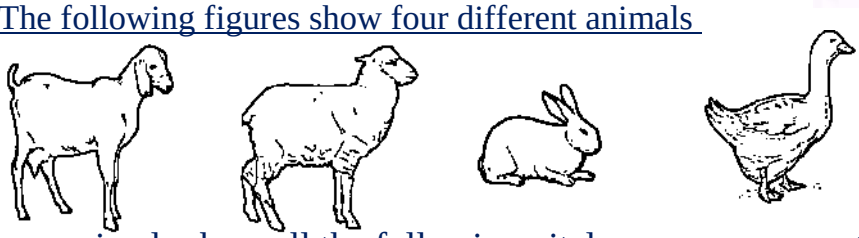
c. Both are affected by light intensity d. Both move in a limited way

27-Which of the following describes the living organism shown in the following figure



a. A unicellular prokaryote that moves using a flagellum
b. A unicellular eukaryote that moves using cilia.
c. A unicellular prokaryote that moves using cilia
d. A unicellular eukaryote that moves using a flagellum

28-The following figures show four different animals



These animals share all the following vital processes, except

a. nutrition b. respiration c. movement life d. cycle

3-Choose from column (B) what suits it in column (A)

(A)	(B)
1-Transport	a-Through which the living organism gets the necessary source to obtain energy
2-Movement	b. Through which the living organism obtains O_2 gas and gets rid of CO_2 gas
3-Excretion	c. Enables the living organism to move from one place to another
4-Gas exchange	d. Through which the living organism gets rid of waste products and excess substances
5-Cellular respiration	e. Through which food is transported from the leaves to the rest of the plant
6- Nutrition	f. Through which digested food and oxygen are transported inside the body of the organism
	g. Through which food substances like glucose are broken down to release energy

4-Complete the following sentences with the appropriate living organisms

1-Human - Frog - Tilapia fish -Locust -Green Algae

1-……from the living organisms that respire through the lungs only.
2-……..from the living organisms that respire through the gills
3-……from the living organisms that respire through tracheal tubes
4-…….from the living organisms that respire through the lungs and skin

2-Bacteria -Amoeba - Euglena - Paramecium

1-…….from unicellular organisms that move using cilia
2-……..from unicellular organisms that move using pseudopodia
3-……from unicellular organisms that move using flagellum

5-Give one example for each of the following

From the beginning of the lessen until before transport

1-A heterotrophic prokaryotic organism
2-A group of living organisms whose cells contain chloroplasts
3-An eukaryotic organism that depends directly on others producers to obtaining foot
4-An inorganic substance used in photosynthesis
5-A substance produced from photosynthesis
6-A technological method to reduce the global warming phenomenon
7-Final product of respiration in plants

From transport to the end of the lesson

8-Transport tissue in plants
9-Excretory substance in human
10-Excretory organ in human
11-Excretory substance in plants
12-Structures involved in excretion in plants
13-A means of movement in unicellular organisms
14-Limited movement in plants

6-Mark (√) or (x) for each statment, with correction:

From the beginning of the lesson until before transport

1-All prokaryotes are autotrophs ( )
2-The green algae Spirogyra contains chloroplasts autotrophs ( )
3-All consumers are heterotrophic organisms autotrophs ( )
4-Green plants consume oxygen gas during photosynthesis autotrophs ( )
5-Photosynthesis produces glucose in the roots autotrophs ( )
6-The scientists have developed artificial photosynthesis to reduce food( ) problems for human autotrophs ( )
7-CO_2 emissions from car exhausts increases the global warming( )
8-All eukaryotes have specialized respiratory systems( )
9-Obtaining oxygen from surrounding environment and getting rid of CO_2 in living organisms is called gas exchange( )
10-The respiratory organ in insects differs from that in fish( )
11-The respiratory organ is similar in both amphibians and mammals( )
12-Plants carry out respiration during the day and stop at the night( )
13-The vital process that occurs in chloroplasts of the plant is the opposite of the process occurring in mitochondria( )

From transport to the end of the lesson

14-The processes of circulation in humans and transport in plants are similar( )
15-Blood circulates in an open cycle in humans( )
16-Arteries connect to veins through blood capillaries( )
17-Both O_2 and CO_2 gases transport with blood from the heart to all body cells( )
18-The digestive system is an open path for food in the body( )

19-Water and mineral salts transport through phloem tissue, while food transport through xylem tissue( )
20-The lungs function like that of stomata in excreting CO, and excess water( )
21-Dialysis machines purify blood from excess water and salts only( )
22-Guard cells control loss of excess water in plants( )
23-The movement of some plant flowers is affected by sunrise and sunset only( )

7-Choose the odd word out, then state the relation between the rest

1-Bean/Wheat/Com/Cows
2-Frog/Bee/Human/Corn
3- CO_2 gas/Water/Salts/Glucose
4-Water/Oxygen/Carbon dioxide/Light energy
5-Hydrogen gas/Oxygen gas / Carbon dioxide gas/Artificial leaves

8-Give reason for each of the following

From the beginning of the lesson until before transport

1-Food is an essential element for the life of living organisms
2-Clover is an autotrophic organism
3-The camel is a heterotrophic organism
4-Cattle are considered consumers
5-Artificial photosynthesis plays an important role in protecting the environment
6-Photosynthesis and respiration in plants are opposite processes
7-Cellular respiration is a continuous process throughout the day

From transport to the end of the lesson

8-Arteries differ from veins in the human circulatory system
9-Blood flows in a closed cycle in humans
10-Phloem tissue in plants is functionally similar to most arteries in humans
11-The dialysis machine performs the function of the kidneys in the human body
12-Plants can get rid of excess water

9-What is meant by

From the beginning of the lesson until before transport

1-Nutrition in living organisms
2-Autotrophic organisms
3-Heterotrophic organisms
4-Producers
5-Consumers
6-Artificial photosynthesis
7-The global warming phenomenon
8-Gas exchange process
9-Cellular respiration
10-Excretion in living organisms
11-Movement in living organisms

Lesson (3) Microbes

The Microbes

Microbes are microscopic living organisms, most of them can not be seen by the naked eye, they are found everywhere around us including inside our bodies, and they can be either beneficial or harmful.

الميكروبات هي كائنات حية مجهرية، معظمها لا يمكن رؤيته بالعين المجردة، وتوجد في كل مكان حولنا بما في ذلك داخل أجسامنا، ويمكن أن تكون مفيدة أو ضارة.

Classification of Microbes

Prokaryotes				Eukaryotes		
such as Bacteria				such as		
				Protozoa	Fungi	
Root nodule bacteria	Decomposition bacteria	Lactic acid bacteria	Salmonella Typhi bacteria	Entamoeba Histolytica	yeast fungus	Penicillium fungus

Viruses are neither classified as prokaryotes nor eukaryotes because they are not typically living organisms. They can only reproduce inside the host body of the living organism, while outside the host body they exist in a non-living form

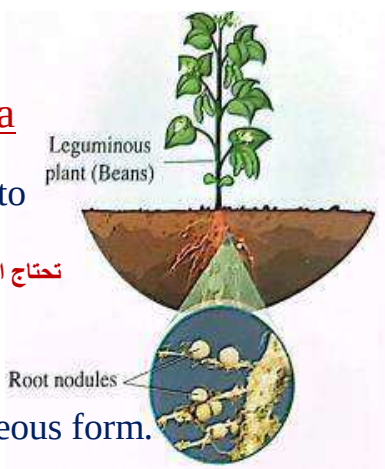
الفيروسات لا يتم تصنيفها على أنها بدائية النواة أو حقيقية النواة لأنها ليست كائنات حية بشكل عام.
لا يمكنها التكاثر إلا داخل جسم الكائن الحي المضيف، بينما توجد خارج جسم الكائن الحي في شكل غير حي.

First Beneficial Microbes أولا الميكروبات النافعة

1-Beneficial Bacteria البكتيريا النافعة -

A- Root nodule bacteria and Decomposition bacteria

أ- بكتيريا العقد الجذرية والبكتيريا المحللة



Green plants need Carbon, hydrogen and oxygen elements to form carbohydrates in the process of photosynthesis

تحتاج النباتات الخضراء إلى عناصر الكربون والهيدروجين والأكسجين لتكوين الكربوهيدرات في عملية التمثيل الضوئي

Nitrogen element to form proteins which are used in the growth of cells and tissues

عنصر النيتروجين لتكوين البروتينات التي تستخدم في نمو الخلايا والأنسجة

Plants cannot use nitrogen from the air or the soil in its gaseous form.

لا تستطيع النباتات استخدام النيتروجين من الهواء أو التربة في شكله الغازي.

Root nodule bacteria, which live on the roots of leguminous plants like clover, beans and peas in special structures called root nodules

بكتيريا العقد الجذرية، التي تعيش على جذور النباتات البقولية مثل البرسيم والفاصوليا والبازلاء في هياكل خاصة تسمى العقد الجذرية

Root nodule (Nodular) Bacteria (beneficial bacteria)(بكتيريا العقد الجذرية (البكتيريا النافعة

G.R.? The roots of legumes, such as beans, contain special structures called root nodules.

ج.ر.؟ تحتوي جذور البقوليات كالفاصوليا على تراكيب خاصة تسمى العقد الجذرية

root nodules of legumes contain nodular bacteria that provide the plant with nitrogen to build proteins used in the growth of its cells and tissues

لأن العقد الجذرية للبقوليات تحتوي على بكتيريا عقدية تزود النبات بالنيتروجين لبناء البروتينات المستخدمة في نمو خلاياه وأنسجته

G.R.? The After harvesting leguminous plants, farmers leave their roots in the soil

ج.ر.؟ بعد حصاد النباتات البقولية يترك المزارعون جذورها في التربة

The roots decompose by bacteria into nitrogenous compounds that are soluble in water, which increase the soil fertility and maintain the cycle of the necessary .elements

تتحلل الجذور بواسطة بكتيريا إلى مركبات نيتروجينية قابلة للذوبان في الماء مما يزيد من خصوبة التربة ويحافظ على دورة العناصر الضرورية

Decomposition bacteria (the decomposers) are organisms that obtain their food by .decomposing dead organisms and the remains of plant and animal substances

بكتيريا التحلل (المحللات) هي كائنات حية تحصل على غذائها من خلال تحلل الكائنات الميتة وبقايا المواد النباتية والحيوانية

B- Lactic acid Bacteria ب- بكتيريا حمض اللاكتيك

Used in making yogurt rich in تستخدم في صناعة الزبادي الغني

Protein, which is necessary for body building and muscle growth

Calcium, which is necessary for healthy bones and teeth

بالبروتين الضروري لبناء الجسم ونمو العضلات - الكالسيوم الضروري لصحة العظام والأسنان

Steps of making yogurt خطوات صناعة الزبادي

1-Heat one liter of milk with continuous stirring until it boils for 25 minutes G.R To kill any bacteria in the milk

1-سخن لتر من الحليب مع التحريك المستمر حتى يغلي لمدة 25 دقيقة... ج.ر لقتل أي بكتيريا في الحليب

2-Let the milk cool down to warm (at a temperature of 42°C)

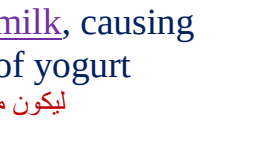
2-ترك الحليب يبرد حتى يصبح دافئاً (عند درجة حرارة 42 درجة مئوية)

3-Add half a cup of previously prepared yogurt to the milk... G.R

Because the previously prepared yogurt contains lactic acid bacteria

3-أضيفي نصف كوب من الزبادي المحضر مسبقاً إلى الحليب... ج.ر

لأن الزبادي المحضر مسبقاً يحتوي على بكتيريا حمض اللاكتيك



4-Pour the milk into suitable containers and leave them in a warm place (at a temperature of 35°C to 45°C) for 4 to 5 hours... G.R

4-صب الحليب في أوعية مناسبة واتركيه في مكان دافئ (عند درجة حرارة 35 درجة مئوية إلى 45 درجة مئوية) لمدة 4 إلى 5 ساعات... ج.ر

To be suitable for bacterial growth to complete the fermentation of the milk, causing the milk to coagulate and change its taste into the distinctive sour taste of yogurt

ليكون مناسباً لنمو البكتيريا لإتمام عملية تخمير الحليب مما يتسبب في تخثره وتغيير مذاقه إلى الطعم الحامض المميز للزبادي

5-Put the yogurt containers in the refrigerator until it is used.. G.R

To stop the activity of lactic acid bacteria

5- ضعي عبوات الزبادي في الثلاجة لحين استعمالها.. ج.ر لإيقاف نشاط بكتيريا حمض اللاكتيك

Lactic acid bacteria convert lactose (milk sugar) into lactic acid, which gives yogurt its distinctive sour taste and thickness

تقوم بكتيريا حمض اللاكتيك بتحويل اللاكتوز (سكر الحليب) إلى حمض اللاكتيك الذي يعطي الزبادي طعمه الحامض المميز وسمكه

Milk fermentation: A biological process in which lactic acid bacteria convert lactose .sugar directly it into yogurt

تخمير الحليب: عملية بيولوجية فيها بكتيريا حمض اللاكتيك سكر اللاكتوز وتحوله مباشرة إلى زبادي.

Milk coagulation: The process of converting milk from its liquid form to a semi-solid form due to the action of lactic acid bacteria

تخثر الحليب (السمك): عملية تحويل الحليب من شكله السائل إلى شكل شبه صلب بسبب عمل بكتيريا حمض اللاكتيك

What are the results of? Keeping yogurt out of the refrigerator

increases the yogurt acidity and spoils its taste due to producing more lactic acid,

ما هي نتائج؟ حفظ الزبادي خارج الثلاجة يزيد من حموضة الزبادي ويفسد طعمه بسبب إنتاجه المزيد من حمض اللاكتيك،

G.R we add a spoonful of sugar to the salt solution used during making pickled olives,...

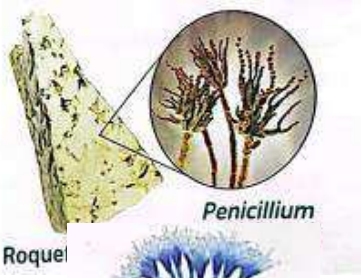
أضف ملعقة سكر إلى محلول الملح المستخدم أثناء عمل مخلل الزيتون،...

To reduce the bitterness of the olives and improve the taste, as sugar acts as a food source for beneficial bacteria, which convert the sugar into lactic acid

لتقليل مرارة الزيتون وتحسين الطعم، حيث يعمل السكر كمصدر غذائي للبكتيريا المفيدة، التي تحول السكر إلى حمض اللاكتيك

2-Beneficial Fungi الفطريات المفيدة

A- Penicillium Fungi فطر البنسليوم



Penicillium Roqueforti fungus فطر البنسليوم روكفورتي

Used in making Roquefort cheese,

يستخدم في صناعة جبن الروكفورت،

Penicillium Notatum fungus Discovered by the English scientist Alexander Fleming in 1928, who found that Penicillium Notatum secretes a substance that stops the ..growth and reproduction of a certain type of bacteria

فطر البنسليوم نوتاتوم اكتشفه العالم الإنجليزي ألكسندر فليمنج عام 1928، الذي وجد أن البنسليوم نوتاتوم يفرز مادة توقف نمو وتكاثر نوع معين من البكتيريا

Fleming extracted from this substance the well known antibiotic which is called "penicillin" - named after the Penicillium fungus - it is used to kill bacteria that cause some diseases such as diphtheria and tonsillitis

استخرج فليمنج من هذه المادة المضاد الحيوي المعروف والذي يسمى "البنسلين" - نسبة إلى فطر البنسليوم - ويستخدم لقتل البكتيريا المسببة لبعض الأمراض مثل الديفتريا والتهاب.

G.R. Roquefort cheese has a distinctive taste and various colors

يتميز جبن الروكفورت بطعم مميز وألوان متعددة

Due to the presence of Penicillium Roqueforti fungus, which gives roquefort cheese its distinctive taste and various colors

بسبب وجود فطر البنسليوم روكفورتي الذي يعطي جبن الروكفورت طعمه المميز وألوانه المتعددة

Fleming was a Scottish scientist born in 1881 and died in 1955

فليمنج عالم اسكتلندي ولد سنة 1881 وتوفي سنة 1955

He is famous for discovering penicillin, which is extracted from Penicillium Notatum fungus which is considered the first effective antibiotic

اشتهر باكتشافه البنسلين الذي يستخرج من فطر البنسليوم نوتاتوم والذي يعتبر أول مضاد حيوي فعال

He noticed the formation of a green fungus on the surface of one of the bacterial cultures in his lab when it was exposed to air, this .fungus killed the surrounding bacteria

لاحظ تكون فطر أخضر على سطح إحدى المزارع البكتيرية في مختبره عند تعرضها للهواء، هذا الفطر قتل البكتيريا المحيطة

He was awarded the Nobel Prize In Medicine in 1945 for this discovery

حصل على جائزة نوبل في الطب سنة 1945 عن هذا الاكتشاف

B- Yeast fungus

It is a source of vitamin (B) complex and is rich in antioxidants

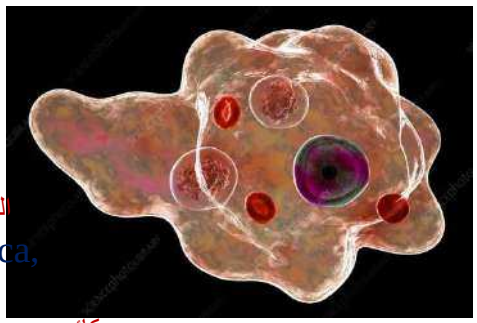
فطر الخميرة وهو مصدر لمجموعة فيتامين (ب) وهو غني بمضادات الأكسدة.

It is used in making bread and ethyl alcohol (ethanol) production

يستخدم في صناعة الخبز وإنتاج الكحول الإيثيلي (الإيثانول)

Second Harmful Microbes ثانيا الميكروبات الضارة

1-Breathing 2-Eating (ingesting) contaminated food
3-Penetration of the skin and reach the bloodstream
- التنفس 2- تناول (ابتلاع) الطعام الملوث3- اختراق الجلد والوصول إلى مجرى الدم



Some Diseases Caused by Food Contamination
بعض الأمراض التى يسببها تلوث الطعام

1- Dysentery الدوسنتاريا(الزحار)

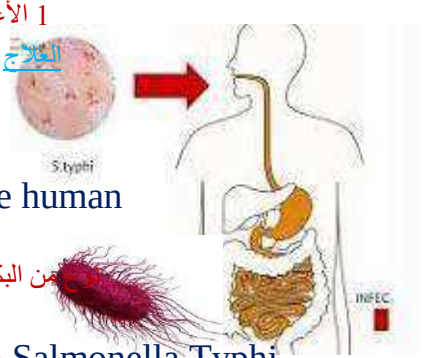
Disease causing agent (pathogen) العامل المسبب للمرض (الممرض)
A unicellular protozoan known as Entamoeba Histolytica, which lives in the patient's large intestine
كائن وحيد الخلية يعرف باسم Entamoeba Histolytica، والذي يعيش في الأمعاء الغليظة للمريض

How the disease is transmitted كيف ينتقل المرض
Through ingesting (swallowing) food contaminated with the microbe
من خلال تناول (ابتلاع) الطعام الملوث بالميكروب

Symptoms 1-Repeated bloody diarrhea 2-Stomach pain 3-Loss of appetite 4-Weight loss 5-Continuous fatigue
1 الأعراض - الإسهال الدموي المتكرر 2- آلام المعدة 3- فقدان الشهية4- فقدان الوزن 5- التعب المستمر

Treatment Using antiprotozoal drugs العلاج باستخدام الأدوية المضادة للميكروبات

2-Typhoid Disease مرض التيفوئيد



Disease causing agent (pathogen) العامل المسبب للمرض (الممرض)
A type of bacteria called Salmonella Typhi, which infects the human digestive (gastrointestinal) tract, thus it is a bacterial disease
من البكتيريا تسمى السالمونيلا التيفية، والتي تصيب الجهاز الهضمي للإنسان، وبالتالي فهي مرض بكتيري

How the disease is transmitted كيف ينتقل المرض
Through ingesting food or drinking water contaminated with Salmonella Typhi
من خلال تناول الطعام أو شرب الماء الملوث بالسالمونيلا التيفية

Symptoms 1-High fever (the body temperature can reach 40°C 2- Fatigue 3-Headache 4-Stomach and muscle pain 5-Flatulence
1 الأعراض - ارتفاع درجة الحرارة (قد تصل درجة الجسم إلى 40 درجة مئوية) 2- التعب3- الصداع 4- آلام المعدة والعضلات 5- انتفاخ البطن

Treatment: Using antibiotics العلاج: استخدام المضادات الحيوية

Some Healthy Habits for Disease Prevention
بعض العادات الصحية للوقاية من الأمراض

Washing vegetables and fruits thoroughly before eating رب ما لا يقل عن 3 لتر من الماء النقي يومياً	Not leaving food uncovered to protect it from contamination عدم ترك الطعام مكشوفاً لحمايته من التلوث غسل الخضار والفواكه جيداً قبل الأكل	Washing hands before eating and after using the bathroom	Brushing teeth with a personal toothbrush after meals غسل الأسنان بفرشاة أسنان شخصية بعد الأكل غسل دين قبل الأكل وبعد استخدام الحمام	Drinking at leas 3 liters of pure water daily رب ما لا يقل عن 3 لترات من الماء النقي يوميًا

Q. What is the importance of brushing teeth after meals س. ما أهمية غسل الأسنان بعد الأكل
To eliminate bacteria that accumulate in the mouth after eating, to help preventing .diseases and maintaining healthy teeth and fresh breath
للقضاء على البكتيريا التي تتراكم في الفم بعد الأكل، للمساعدة في الوقاية من الأمراض والحفاظ على صحة الأسنان ورائحة الفم الكريهة.

Unit (3) Lesson (3)

Questions
UNIT 3 | Lesson 3

1-Write the scientific term for each of the following

1- Microscopic organisms that may be beneficial or harmful to other living organisms ( )
2-Living organisms that spread in water, soil, air and inside our bodies ( )
3-An element involved in producing proteins which are necessary for the growth of plant cells and tissues ( )
4-Plants that are unable to utilize nitrogen from the air or soil in its gaseous form ( )
5-A type of bacteria that lives inside nodules found on the roots of certain plants ( )
6-A type of bacteria that provides nitrogen to the bean plant in the form of usable compounds ( )
7-A type of bacteria that increases soil fertility and maintains the cycle of elements in nature ( )
8-Special structures found on the roots of certain plants in which a specific type of bacteria lives ( )
(9) A food product rich in protein and calcium ( ))
10-Bacteria that convert lactose in milk into the acid found in yogurt ( )
11-An acid that gives yogurt its distinctive taste and thickness( )
12-A fungus responsible for the distinctive taste and various colors of Roquefort cheese ( )
13-A Scottish scientist who won the Nobel Prize in Medicine in 1945( )
14-A scientist famous for discovering the first effective antibiotic ( )
15-The first antibiotic to be extracted from a fungus( )
16-The fungus from which penicillin was first extracted( )
17-A fungus used in making bread and ethyl alcohol production ( )
18-A unicellular protozoan that causes dysentery disease in human( )
(19) A disease among its symptoms are repeated bloody diarrhea, loss of appetite am continuous fatigue( )
20-A type of bacteria that causes typhoid fever disease in human ( )
21-A disease among its symptoms are high fever, fatigue and stomach and muscle pain ( )

2-Choose the correct answer

1-All the following are classified as microbes that belong to prokaryotes or eukaryotes, except
a. bacteria b. fungi c. viruses d. protozoa
2-All the following are eukaryotic microbes, except
a. Entamoeba Histolytica b. Penicillium fungus
c. yeast fungus d. bacteria

3-Which of the following is a leguminous plant
a. Wheat b. Peas c. Rice d. Corn
4-Which of the following elements is absorbed by nodular bacteria from the soil
a. Carbon b. Hydrogen c. Oxygen d. Nitrogen
5-Which of the following is difficult for the clover plant to absorb from the atmospheric air or soil in its gaseous form
a. Carbon b. Hydrogen c. Nitrogen d. Carbon dioxide
6-All the following describe root nodule bacteria except that they are
a. prokaryotes . b. microscopic organisms
c. beneficial to plants d. multicellular organisms

7-Which of the following organisms plays a role in increasing soil fertility
a. Penicillium fungus only b.Yeast fungus only
c. Decomposition bacteria and yeast fungus
d. Decomposition bacteria and root nodule bacteria
8-Which of the following organisms helps in maintaining the cycle of elements in nature
a. Amoeba b.Decomposition bacteria c. Paramecium d. Viruses
9-Which of the following is necessary for healthy bones and teeth
a. Calcium b. Protein c. Sugars d. Carbon
10-Which of the following is present in previously prepared yogurt and is essential making yogurt
a. A type of bacteria b. Lactose sugar c. Lactic acid d. Calcium
11-When making yogurt, the containers should be left in a warm place at a temperature of
a. 10°C to 20°C b. 15°C to 25°C c. 35°C to 45°C d. 20°C to 40°C
12-How do bacteria convert milk into yogurt
a. By producing ethyl alcohol b. By producing lactic acid
c. By producing carbon dioxide gas CO_2 d. By producing lactose sugar.
13-Which of the following represents a food source for the beneficial bacteria used in making pickles
a. Salt solution b. Sugar c. Lactic acid d. Alcohol
14-All the following are beneficial fungi, except
a. Penicillium roqueforti b. Penicillium Notatum
c. yeast d. bread mold
15-All the following are characteristics of fungi, except that
a. they are mostly multicellular organisms.
b. their cells contain true nuclei (eukaryotes)
c. some of them have the ability to produce antibiotics
d. all of them are beneficial to human

16- The scientist who discovered penicillin is
a. Dalton b. Mendeleev c. Fleming d. Rutherford
17-Which of the following fungi is a source of vitamin B complex
a. Yeast b. Penicillium c. Mushroom d. Bread mold
18. Which of the following microbes is used in producing ethyl alcohol
a. Bacteria b. Yeast fungus c. Penicillium fungus d. Mushroom fungus

19-All the following are true about yeast fungus, except that it
a. is used in making pastries b. is a prokaryotic multicellular organism
c. is a beneficial microbe to human d. is an eukaryotic unicellular organism

20-Which of the following industries uses bacteria
a. Ethyl alcohol b. Bread c. Yogurt d. Penicillin

21-All the following can be produced by fungi, except
a. cheese b. yogurt c. penicillin d. ethyl alcohol

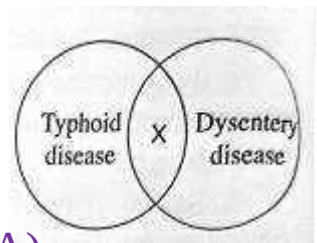
22-Which of the following causes dysentery disease مرض الزحار
a. Salmonella Typhi b. Entamoeba Histolytica
c. Penicillium Notatum d. Penicillium Roqueforti

23-All the following describe Entamoeba Histolytica, except that it
a. is a protozoan b. is a unicellular microbe
c. lives in the large intestine of the patient
d. enters the human body through respiration

24-Which of the following symptoms characterizes typhoid fever disease
a.Weight loss b. Fatigue c. Loss of appetite d. High fever

ارتفاع درجة الحرارة

25-From the opposite Venn diagram
Which of the following represents (X)?
a.The disease causing agent (pathogen)
b. Some similar symptoms
c. Treatment methods d. Microbe classification



3-Choose from column (B) what suits it in column (A)

1- (A) The microbe	(B)The use
1- Lactic acid bacteria	a- Production of a medicine for typhoid fever
2- Penicillium Roqueforti fungu	b. Production of ethyl alcohol
3- Penicillium Notatum fungus	c. Production of some types of cheese
4- Yeast fungus	d. Production of lactic acid
	e. Production of penicillin

2- (A) The disease	(B) The treatment
1- Diphtheria	a- Treated with antiprotozoal drugs
2- Typhoid fever	b. Treated with penicillin
3- Dysentery	c. Treated with antifungal drugs
	d. Treated with antibiotics

4-Complete the following sentences with the appropriate organisms

a-Salmonella Typhi b-Penicillium Roqueforti c.Yeast Fungus
d. Lactic acid bacteria e. Entamoeba Histolytica

1-……is a beneficial prokaryotic microbe
2-……is a harmful eukaryotic microbe
3-……is a beneficial unicellular microbe
4-……is a beneficial multicellular microbe

5-Give one example for each of the following

1-A beneficial prokaryotic microbe
2- A harmful prokaryotic microbe
3-A harmful eukaryotic protozoan
4- A beneficial eukaryotic microbe
5-An element necessary for the growth of plant cells and tissues
6-An element involved in photosynthesis
7-A plant that cannot absorb nitrogen from the atmospheric air or soil in its gaseous form
8-A type of bacteria that lives on the roots of leguminous plants
9-A food rich in both protein and calcium
10-A fungus used in making some types of cheese
11-A bacterial disease that affects human
12-A fungus used in producing penicillin
13-A fungus used as a food source for human
14-A disease transmitted to human through contaminated food
15-A healthy habit to prevent diseases

6-Mark(√) or (X) for each statement, with correction

1-All microbes are harmful to the health of living organisms ( )
2. Protozoa can be classified as beneficial prokaryotic microbes ( )
3.Penicillium Notatum and yeast are beneficial unicellular fungi ( )
4-Plants need the elements carbon, hydrogen and oxygen to form carbohydrates( )
5-Nitrogen is an essential element in building proteins necessary for plant growth ( )
6-All plants can absorb nitrogen from the air or soil in its gaseous form ( )
7-The root nodules of leguminous plants contain beneficial protozoa( )
8-Beneficial microbes in the soil can provide legumes with the nitrogen they need( )
9-Soil fertility increases after the roots of bean plants are decomposed ( )
10-Yogurt is rich in protein, which is necessary for healthy bones and teeth ( )
11-Milk should be boiled for 25 minutes during making yogurt ( )
12-Previously prepared yogurt is added to milk immediately after boiling ( )
13-Milk fermentation into yogurt requires suitable temperature conditions for bacterial growth ( )
14-Lactose in yogurt gives it its distinct taste and texture ( )
15-It is preferable to add a spoonful of sugar to the salt solution during making pickles( )
16-The fungi which are beneficial for human include certain types of Penicillium fungi and yeast fungus ( )
17-The distinctive taste and various colors of Roquefort cheese are due to Penicillium Notatum ( )
18-Dalton discovered that Penicillium Notatum has the ability to produce penicillin
19-The structure of Penicillium Notatum is similar to that of Penicillium Roqueforti
20-Penicillin is used to treat some bacterial, diseases, such as diphtheria ( )

21-Yeast fungus is a source of antioxidants and vitamin ( )
22-Harmful microbes can enter the bloodstream through penetrating the skin ( )
23-Dysentery can be called Amoebic Dysentery ( )
24-Entamoeba Histolytica is a prokaryotic unicellular protozoan ( )
25-One of the main symptoms of dysentery is repeated bloody diarrhea ( )
26- Typhoid disease is a bacterial disease caused by Salmonella Typhi
27-A symptom of typhoid disease is the high fever that can reach 45°C ( )

7-Choose the odd word (phrase) out, then state the relation between the rest

1-Carbon/Hydrogen/Sulphur/Oxygen
2-Clover/Corn/Peas/Beans
3-Photosynthesis process/Bean plant/Nodular bacteria / Root nodules
4-Soil fertility/Cycle of elements in nature/Decomposition bacteria /lactic acid bacteria
5-Lactic acid bacteria / Ethyl alcohol/Lactic acid/Lactose sugar
6-Nodular bacteria/Decomposition bacteria/Lactic acid bacteria / Salmonella Typhi bacteria
7-Diphtheria/Tonsillitis/Typhoid fever/Dysentery

8-Give reasons for each of the following

1-The roots of leguminous plants such as beans contain special structures called root nodules

……..

2-After harvesting leguminous plants, farmers leave their roots in the soil

……..

3-Yogurt is important for human, especially children

……..

4-Milk is boiled thoroughly for a sufficient period during making yogurt

……..

5-Previously prepared yogurt is added to milk during making yogurt

……..

6-The containers containing yogurt are left in a warm place during making it

……..

7-Yogurt should be stored in the refrigerator after preparation until being used

……..

8-Some mothers add a spoonful of sugar to the salt solution during making pickled olives

……..

9-Roquefort cheese has a green color and a distinctive taste

……..

10-The function of Penicillium Roqueforti differs from that of Penicillium Notatum

……..

11-Yeast fungus is important for both nutrition and industry for human

……..

12-Brushing your teeth daily with a personal toothbrush after meals

……..

13-Following healthy habits daily is essential

……..

Unit (4) The (Earth - Sun - Moon) system

Lesson (1) The Earth and the Solar System

The Solar System

One star, the sun, which 8 planets orbit (revolve around) in elliptical paths

النظام الشمسي من نجم واحد هو الشمس، والذي تدور حوله 8 كواكب في مسارات بيضاوية(قطع ناقص) على مسافات مختلفة من الشمس

G.R? The planets do not collide during orbiting the sun.

Because they orbit the sun in elliptical paths at different distances from the sun

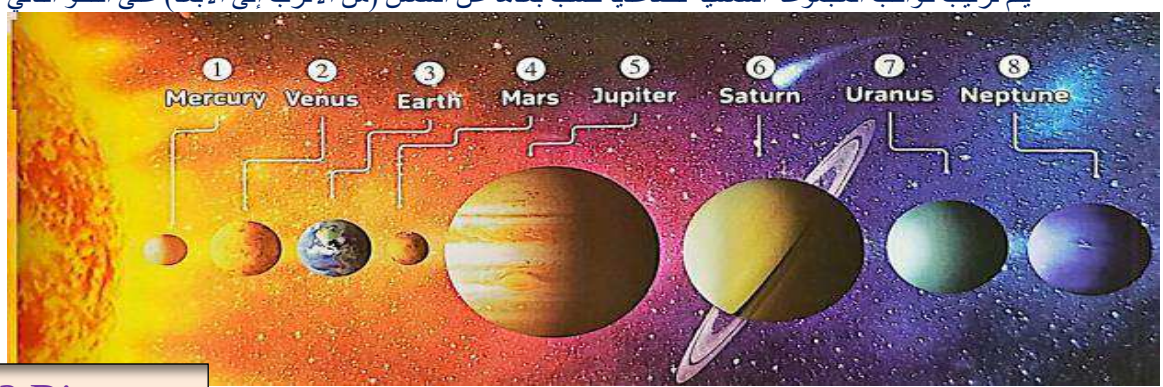
ج.ر؟ لا تتصادم الكواكب أثناء دورانها حول الشمس لأنها تدور حول الشمس في مسارات بيضاوية على مسافات مختلفة من الشمس

Arrangement of the planets According to

1- Distance from the sun

► The planets of the solar system are arranged in ascending order according to the distance from the sun (from the closest to the farthest) as follows:

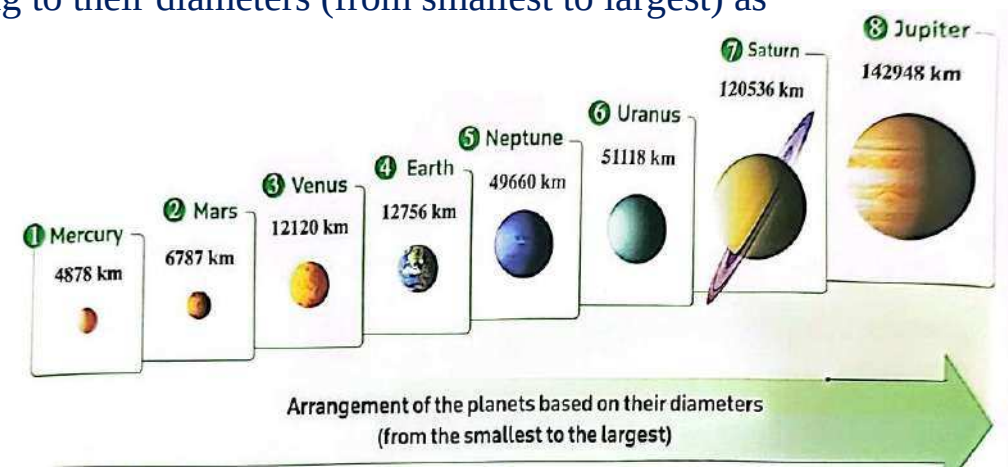
يتم ترتيب كواكب المجموعة الشمسية تصاعديا حسب بعدها عن الشمس (من الأقرب إلى الأبعد) على النحو التالي



2 Diameter

(The diameters of the planets are for comparison purposes only, not for memorization).

►The planets of the solar system are arranged in ascending order according to their diameters (from smallest to largest) as follows:



What is the order of? Earth planet, in terms of :

(1) Distance from the sun. Third order

(2) Size "In ascending order". Fourth order (3) Size "In descending order". Fifth order

Classification of the Planets

The planets of the solar system are classified into two groups based on their distance from the sun

Inner Planets (endo)				Outer Planets (Exo)			
The distance from the Sun							
The four closest planets to the sun are called the inner planets, which are: Mercury- Venus -Earth -Mars				The four farthest planets from the sun are called the outer planets, which Jupiter Saturn Uranus Neptune			
Rocky Planets				Gaseous Planets			
Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune
Has a very thin crust filled with craters caused by meteor impacts	Has a thick crust compared to Mercury's crust	Has a thicker crust than Venus	Has a thick crust relatively similar to Earth's crust is known as the red planet	Composed of gases only, they have no crust		Composed of gases and ice, they have no-crust	
The atmosphere							
Very thin, composed of hydrogen and helium gases	Very dense, composed mainly of carbon dioxide gas	Composed mainly of nitrogen and oxygen gases, where it is the planet of human life	Composed mainly of carbon dioxide gas	Composed of hydrogen and helium gases		Composed of hydrogen and helium gases, in addition to methane gas	
						which gives Uranus a greenish blue color	which gives Neptune a blue colo
No active volcanoes	Many active volcanoes	No active volcanoes	indications of volcanoes, but no current volcanic activity	No volcanoes			

The Sun-Earth System نظام الشمس والأرض

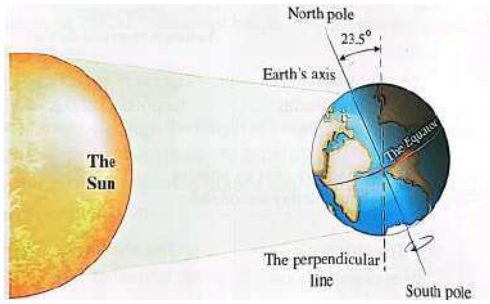
The earth revolves around the sun in an orbital motion due to the gravitational force, and the earth also rotates around its own axis.

تدور الأرض حول الشمس في حركة مدارية بسبب قوة الجاذبية، كما تدور الأرض حول محورها.

The following explains the results of Earth's movement.
وفيما يلي نوضح نتائج حركة الأرض.

1- Earth's Rotation on its Axis1- دوران الأرض حول محورها

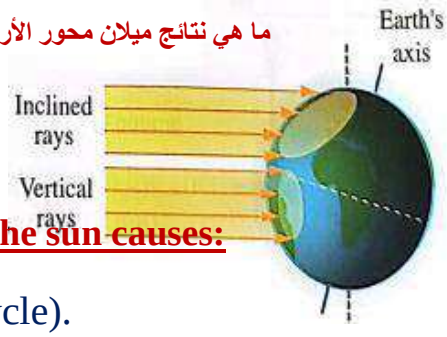
The Earth rotates around its imaginary axis from west to east, it completes a full rotation every 24 hours around its axis.
تدور الأرض حول محورها الوهمي من الغرب إلى الشرق، وتكمل دورة كاملة كل 24 ساعة حول محورها.



Earth's Axis محور الأرض

It is an imaginary straight line extending from the North pole to the South pole, tilts at an angle of 23.5° from the imaginary perpendicular line to its orbit around the sun.
هو خط مستقيم وهمي يمتد من القطب الشمالي إلى القطب الجنوبي، ، ويميل بزاوية 23.5 درجة من الخط العمودي الوهمي إلى مداره حول الشمس.

What are the results of the tilt of the Earth's axis? ما هي نتائج ميلان محور الأرض؟



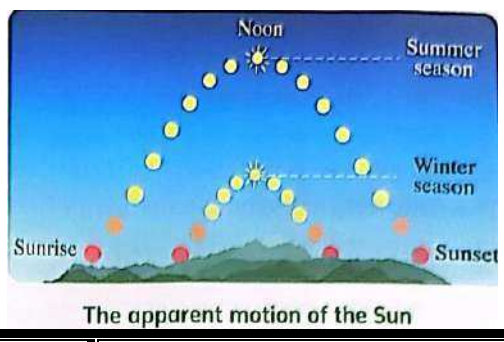
the different areas of Earth's surface, leading to differences in the intensity of sunlight
ينتج عن ذلك اختلاف زاوية سقوط ضوء الشمس على مناطق مختلفة من سطح الأرض، مما يؤدي إلى اختلاف شدة ضوء الشمس .

The rotation of the Earth around its axis in front of the sun causes:
إن دوران الأرض حول محورها أمام الشمس يسبب:

* The alternation of day and night (Day and night cycle).
تعاقب الليل والنهار (دورة الليل والنهار)

The Apparent Motion of the Sun لحركة الظاهرية للشمس

While the Earth rotates on is axis from west to east, the Sun appears In the sky throughout the day or the year as if its position is shifting from east to west, a phenomenon called the apparent motion of the Sun.
The Apparent Motion of the Sun الحركة الظاهرية للشمس

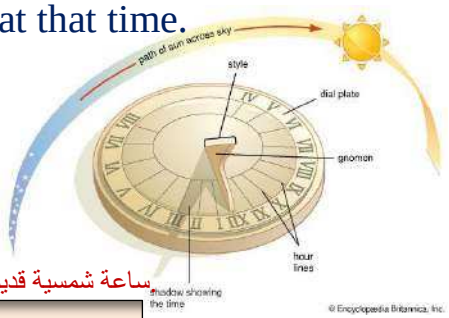


The apparent motion of the Sun

1- At the period between sunrise and noon في الفترة بين شروق الشمس والظهيرة	2-At noon في الظهيرة	3- At the period between noon and sunset في الفترة بين الظهيرة والغروب
The apparent height of the Sun increases gradually يزداد ارتفاع الشمس الظاهري تدريجيًا	The Sun's apparent height reaches its highest point يصل ارتفاع الشمس الظاهري إلى أعلى نقطة له	The Sun's apparent height decreases gradually يتناقص ارتفاع الشمس الظاهري تدريجيا
The length of the shadows cast by objects changes throughout the day as follows يتغير طول الظلال التي تلقيها الأجسام طوال اليوم على النحو التالي		
The length of the shadow is long at sunrise طول الظل طويل عند شروق الشمس	The shadow is the shortest at noon يكون الظل أقصر ما يمكن عند الظهيرة	The shadow is the longest at sunset يكون الظل أطول ما يمكن عند غروب الشمس

The length of an object's shadow	**Long at sunrise and sunset. The shortest at noon. Longer at sunset than at sunrise.**

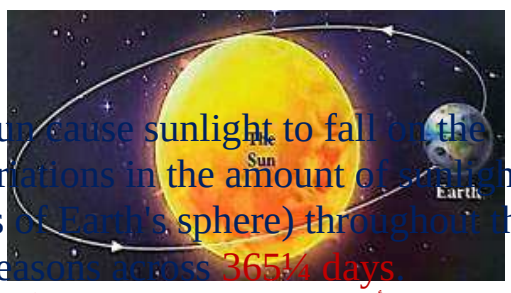
Shadow length at noon< Shadow length at sunrise< Shadow length at sunset
Throughout the same day: as the apparent height of the Sun increases, the shadow length decreases, and vice versa.
G.R. The shadow length at noon is the shortest.
Because the Sun's apparent height is at its maximum at that time.
Technological Application التطبيق التكنولوجي
Sundial ساعة شمسية
An ancient solar clock used to determine the time based on the length and direction of the shadow resulting from the apparent motion of the Sun.



ساعة شمسية قديمة كانت تستخدم لتحديد الوقت بناءً على طول واتجاه الظل الناتج عن الحركة الظاهرية للشمس

2- Earth's Orbit around the Sun مدار الأرض حول الشمس

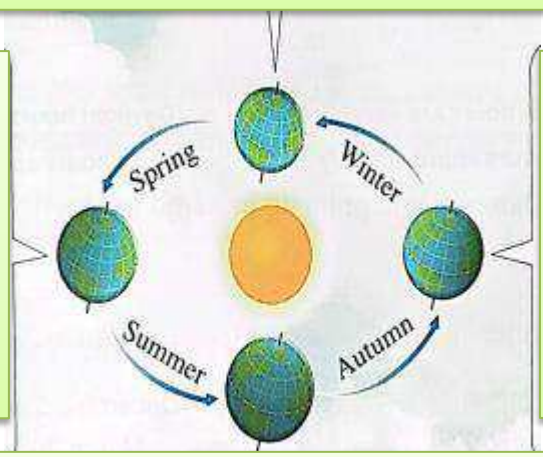
The Earth orbits around the Sun every 365¼ days. This results in
The alternation of the four seasons (The cycle of the seasons).
(تناوب الفصول الأربعة (دورة الفصول).
The cycle of the Seasons دورة الفصول



The tilt of Earth's axis and its orbit around the sun cause sunlight to fall on the Earth's surface at different angles. leading to variations in the amount of sunlight received by Earth's hemispheres (the two halves of Earth's sphere) throughout the year, This results in the alternation of the four seasons across 365¼ days.
يؤدي إمالة محور الأرض ومدارها حول الشمس إلى سقوط ضوء الشمس على سطح الأرض بزوايا مختلفة. يؤدي هذا إلى اختلافات في كمية ضوء الشمس التي يتلقاها نصفا الكرة الأرضية (نصفا الكرة الأرضية) على مدار العام، وهذا يؤدي إلى تناوب الفصول الأربعة على مدار 365¼ يومًا.
The relation between the Earth's axis direction relative to the Sun and the four seasons

-Vernal-(Spring)-Equinox
Occurs on March 21st
The northern end of the Earth's axis neither leans close to nor away from the sun

Summer Solstice
Occurs on June 21st
The northern end of the Earth's axis leans closest to the sun (at an angle of 23.5º)



Winter Solstice
Occurs on December 22nd
The northern end of the Earth's axis leans away from the sun (at an angle of 23. 5º)

Autumnal Equinox
Occurs on September 23rd
The northern end of the Earth's axis neither

The difference in the direction of the tilt of the Earth's axle results in variations in the daylight and night hours throughout the seasons, leading to changes in weather conditions, as explained below:

يؤدي اختلاف اتجاه ميلان محور الأرض إلى اختلافات في ساعات النهار والليل على مدار الفصول، مما يؤدي إلى تغيرات في الظروف الجوية، كما هو موضح أدناه:

Autumn الخريف	Spring الربيع
Timing التوقيت September 23th - December 21 th سبتمبر - 21 ديسمبر 23	Timing التوقيت March 21th - June 20th مارس - 20 يونيو 21
Sunrise and sunset in Egypt on one of the days of this season in 2024 شروق الشمس وغروبها في مصر في أحد أيام هذا الموسم في عام 2024	
Daylight hours(12.05) are equal to night hours approximately ساعات النهار (12.05) تساوي ساعات الليل تقريبًا	Daylight hours (12.10) are equal to night hours approximately ساعات النهار (12.10) تساوي ساعات الليل تقريبًا
Winter الشتاء	Summer الصيف
December 22nd - March 20th 22 ديسمبر 20 مارس	June 21st - September 22nd 21يونيو 22 سبتمبر
The highest it can be	Apparent height of the sun
Sunrise and sunset in Egypt on one of the days of this season in 2024 شروق الشمس وغروبها في مصر في أحد أيام هذا الموسم في عام 2024	
Daylight hours(10.13) are less than night time approximately ساعات النهار (10.13) أقل من ساعات الليل تقريبًا	Daylight hours(13.55) are greater than night time approximately ساعات النهار (13.55) أكبر من ساعات الليل تقريبًا

Identify the apparent height of the Bun at noon during spring comparing with its apparent height in summer and winter, with explanation.

حدد الارتفاع الظاهري للشمس عند الظهيرة في الربيع بالمقارنة مع ارتفاعها الظاهري في الصيف والشتاء مع التوضيح.

A It is lower than in summer and higher than in winter,
because spring precedes summer and follows winter.

أ- يكون ارتفاعها أقل من ارتفاعها في الصيف وأعلى من ارتفاعها في الشتاء، وذلك لأن الربيع يسبق الصيف ويتبع الشتاء.

Throughout the year, leading to changes in weather, temperature and the day length.

على مدار العام، مما يؤدي إلى تغيرات في الطقس ودرجة الحرارة وطول النهار.

The seasons also affect the times of planting and harvesting the different crops in Egypt, as follows

كما تؤثر الفصول على مواعيد زراعة وحصاد المحاصيل المختلفة في مصر، على النحو التالي -

Winter crops المحاصيل الشتوية	Summer crops المحاصيل الصيفية
Orange البرتقال	Watermelon البطيخ
Lettuce الخس	Cucumber الخيار
Wheat القمح	Onion البصل
Clover البرسيم	Zucchini الكوسة

Unit (4) Lesson (1)

1-Write the scientific term for each of the following

The solar system

(1) A star which 8 planets orbit (revolve around) in elliptical paths.

(2) Rocky planets with solid surfaces.

(3) Gaseous planets with no volcanoes.

The Sun-Earth system

(4) An imaginary straight line extending from the North Pole to the South Pole passing through Earth's center.

(5) The appearance of the sun in the sky throughout the day or the year as if its position is shifting from east to west while the Earth rotates around its own axis.

(6) An ancient solar clock used to determine time based on the length and direction of the shadow resulting from the apparent motion of the Sun.

2-Write the term that indicates each of the following:

The solar system

(1) The largest planet in the solar system.

(2) A rocky planet with a very thin atmosphere composed of hydrogen and helium gases.

(3) A planet with many active volcanoes, and its atmosphere is mainly composed of carbon dioxide gas

(4) The planet of human life.

(5) A gaseous planet without a crust, composed of gases and ice, and its atmosphere contains methane gas which gives it a greenish blue colour.

(6) The blue planet.

The Sun-Earth system

(7) A solstice that occurs on December 22^{nd} , caused by the leaning of the northern end of Earth's axis away from the sun at an angle of 23.5^{o}

(8) An equinox that occurs on September 23^{rd} , when the northern end of Earth's axis neither leans close to nor away from the sun.

(9) A season that begins on March 21^{st} , when the daylight hours are equal to the nighttime hours

(10) A season when the apparent height of the Sun in the sky is the lowest.

(11) A season when the number of the daylight hours is greater than the number of the night time hours.

3-Choose the correct answer:

The solar system

(1) Planets orbit the sun in

a. circular paths b. elliptical paths c. straight lines d. zigzag lines

(2) The solar system contains

a. eight stars b. thousands of stars c. millions of stars d.one star

(3) The farthest rocky planet from the Sun is……..

a. Neptune b. Earth c. Mercury d. Mars

4) Earth is the…… planet from the sun.

a. third b. fourth c. fifth d. sixth

5) The smallest planet in the solar system is

a. Jupiter b. Neptune c. Mercury d. Uranus

6) Jupiter exists between

(a) Venus and Mars. b. Mars and Saturn.

c. Earth and Saturn. d. Saturn and Uranus.

7-Within the group of the outer planets, the order of Uranus is the……. planet in distance away from the sun.

a. first b. third c. fourth d. last

8-Which of the following planets does not have a crust?

a. Venus c. Mars b. Earth d. Neptune

9-The atmosphere of the planet of human life is mainly composed of

a. oxygen and carbon dioxide b. oxygen and nitrogen

c. hydrogen and helium d. hydrogen and methane

(10) The main component of the atmosphere of Mars and Venus is

a. Hydrogen b. methane c. helium d. carbon dioxide

(11) The two planets which consist of gases and ice are

a. Jupiter and Saturn . b. Jupiter and Uranus.

c. Uranus and Neptune. d. Saturn and Neptune

(12) The presence of methane gas in the atmosphere of Uranus gives it a

a. Green b. Bluish c. green Blue d.. Greenish blue

(13) Which of the following groups of planets do not have volcanoes?

a. Mercury, Venus, Earth and Mars b. Earth, Jupiter, Saturn and Neptune.

c. Jupiter, Saturn, Uranus and Neptune. d. Mars. Venus, Uranus and Saturn.

(14) Which of the following expresses the characteristics of some planets in the solar system?

a. Mercury and Mars do not have active volcanoes.

b. Venus and Mars do not have an atmosphere.

c. Mars and Saturn have the same atmosphere.

d. Jupiter and Mars have the same crust composition.

(15) All the following describe the outer planets, except that

a. they are gaseous planets. (b) they are rocky planets.

c. they have no crust.

(d) their atmospheres contain helium and hydrogen gases.

The Sun-Earth system

(16) Earth completes a full rotation around its own axis approximately every

a. 365 ¼ days b. 30 months c. 24 hours (d) 24 hours.

(17) Earth's axis tilts from the imaginary perpendicular line to its orbit around the Sun at an angle of

a. 32º b. 23º c. 23.5º b. 32.5º

(18) Day and night cycle occurs due to

a. the apparent height of the Sun. b. Earth's rotation on its axis.

Earth's revolution around the Sun d. the apparent motion of the Sun.

(19) The apparent motion of the Sun is due to

a. the Sun revolution around the earth, b. the Sun rotation around its axis.

(c) Earth rotation around its axis d. Earth revolution around the Sun.

(20) The apparent height of the Sun is at its maximum during

a. winter b. spring c. summer d. autumn

(21) The Sun is at its highest apparent level in the sky at

a. sunrise. b. noon. c. early morning. d. sunset

(22) The length of a shadow of an object changes throughout the day due to

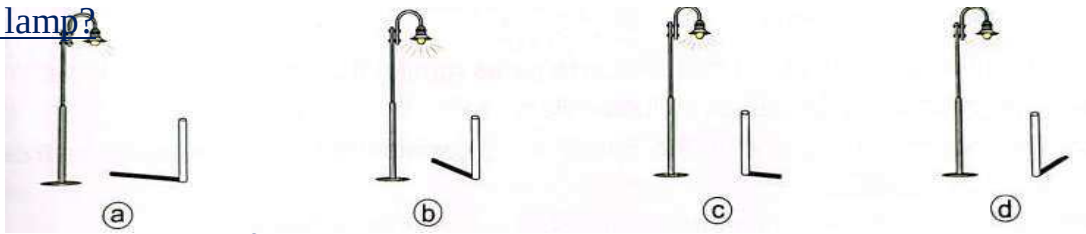
a. earth's gravity b. the difference in day and night hours.

c. the day and night cycle. d. the apparent motion of the Sun.

(23) At which of the following times is the shadow of an object the largest?

a. 9 am b. 12 am c. 12 pm d. 5 pm

(24) Which of the following represents the shadow of a stick formed by the light of the street lamp?



(25) The revolution of Earth around the Sun results in

(a) the succession of night and day. b. the cycle of the seasons.

c. the apparent motion of the Sun.

d. the change in shadow lengths throughout the day.

26) The northern end of Earth's axis leans close to the Sun at an angle of 23.5º in

a. 21st of March b. 21st of June. c. 23rd of September. D.22nd of December

27) The northern end of Earth's axis leans away from the Sun in

a. vernal equinox b. autumnal equinox. c. winter solstice. d. summer solstice

28) The number of daylight hours is greater than the number of night time hours in

a. Summer b. winter c. spring d. autumn

9) The number of night time hours is greater than the number of daylight hours in

a. January 2nd b. October 28th c. August 10th d. April 23rd

30) All the following are summer crops, except

a. onion. b.cucumber c. watermelon d. lettuce

4-Choose from column (B) and (C) what suits it in column (A)

(A)	(B)	(B)
1- Earth	a- Fifth planet from the Sun	A- Has a very thin crust full of craters
2- Mercury	b. Farthest planet from the Sun	B- Its atmosphere is mainly composed of nitrogen and oxygen gases
3- Jupiter -	c. Seventh planet from the Sun	C- Known as the blue planet
4- Neptune	d. Third planet from the Sun	D- is the largest planet
5-Uranuse	e. Closest planet to the Sun	E- Its colour is greenish blue due to the presence of methane in its atmosphere
	f- Second closest planet to the Sun	F- Its atmosphere mainly consists of carbon dioxide

5-Correct the underlined words:

The solar system

(1) There are 9 planets orbiting the Sun In different orbits.
(2) Saturn is the sixth largest planet according to the size
(3) Neptune's diameter is larger than Mars's diameter but smaller than Earth's diameter.
(4) Venus has a thick crust and an atmosphere composed mainly of oxygen and nitrogen gases.
(5) Mars is known as the blue planet.

The Sun-Earth system

(6) Earth rotates around its own axis once every 42 hours, which is known as the day.
(7) Earth revolves around the moon, causing the day and night cycle.
(8) The apparent height of the Sun is at its maximum during spring.
(9) The apparent height of the Sun decreases gradually at noon.
(10) The period known as the equinoxes is on June 21 and December 22
(11) The northern end of Earth's axis leans to the Sun during the summer solstice at an angle of 35.5º
(12) In summer, the number of night hours equals the number of daylight hours.
(13) The day length is greater than the night time length in autumn.
(14) Wheat is a summer crop.

6-Mark (√) or (x) for each statement, with correction:

The solar system

(1) Mercury is the closest planet to the Sun and the largest in size. ( )
(2) Mars is the first in the group of the outer planets. ( )
(3) Neptune is the second farthest gaseous planet from the Sun. ( )
(4) Mercury has a thin crust filled with craters caused by meteor impacts. ( )
(5) There is no life except on the surface of Mars. ( )
(6) The bluish green colour of Uranus is due to the presence of methane gas. ( )

The Sun-Earth system

(7) The Sun's position in the sky changes throughout the day due to Earth's( )

(8) The difference in the Sun's apparent height in the sky during the day affects the length of the shadow cast by an object. ( )

(9) It is night time in the half of the earth facing away from the Sun as Earth rotates around its own axis. ( )

(10) The northern end of Earth's axis leans to the Sun starting from March 21 ( )

(11) The difference in direction of the tilt of Earth's axis leads to a variation in the length of each of day and night during the seasons of the year. ( )

(12) In winter, the number of daylight hours equals the number of nighttime hours. ( )

(13) Wheat is preferably planted in the summer season.

7-Give reasons for each of the following:

The solar system

(1) The planets do not collide while erbiting the Sun.

……..

(2) Mercury's crust is filled with craters.

……..

(3) The colour of Uranus appears greenish blue.

……..

(4) Gaseous planets do not have volcanoes.

……..

The Sun-Earth system

(5) The succession of day and night on Earth's surface.

……..

(6) The apparent motion of the Sun from east to west during the day.

……..

(7) The variation in the angle at which sunlight falls on different regions on Earth's surface.

……..

(8) The variation in the length of a shadow cast by an object throughout the day.

……..

(9) The length of a shadow during the day in summer is shorter than its length during the day in winter at the same time of the day

……..

(10) The length of a shadow at noon is the shortest

……..

(11) The alternation of the four seasons.

……..

(12) The variation in the number of daylight and nighttime hours.

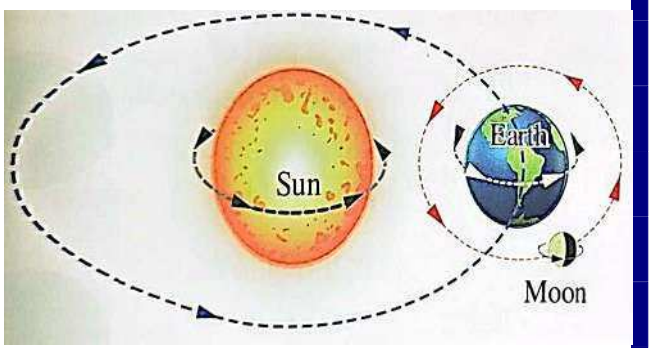
……..

Lesson (2) Lunar eclipse

The moon is a dark (opaque) body that orbits the Earth
Its rotation around its own axis also takes 29.5 days
It is the closest celestial body to the Earth
It appears illuminated as it reflects sunlight
Its revolution around the Earth takes 29.5 days

Moon phases أطوار القمر

The moon appears to change shape throughout the Arabic (lunar) month, but it doesn't actually change. In fact, what changes is the size of the part of the moon that can be seen from the illuminated part that reflects sunlight.



القمر يبدو أن يتغير شكله طوال الشهر العربي (القمري)، لكنه في الواقع لا يتغير. في الواقع، ما يتغير هو حجم الجزء من القمر الذي يمكن رؤيته من الجزء المضاء الذي يعكس ضوء الشمس.

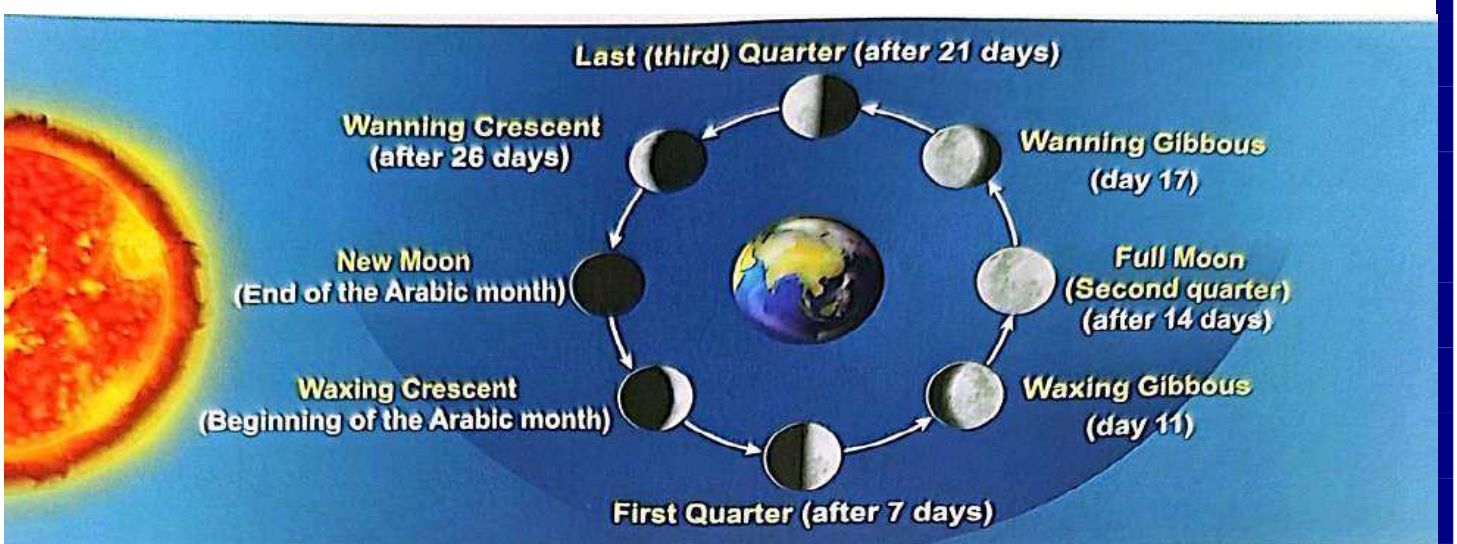
The moon orbits the Earth from east to west, so its position relative to both the sun and e Earth changes, leading to eight phases known as the phases of the moon.

يدور القمر حول الأرض من الشرق إلى الغرب، لذا يتغير موقعه بالنسبة لكل من الشمس والأرض، مما يؤدي إلى ثماني مراحل تُعرف بأطوار القمر.

The phases of the moon أطوار القمر

They are the different stages that the moon goes through during its orbit around the Earth as a result of the changing of its position relative to both the sun and the Earth

هي المراحل المختلفة التي يمر بها القمر أثناء مداره حول الأرض نتيجة لتغير موقعه بالنسبة لكل من الشمس والأرض.


Last (third) Quarter (after 21 days)
Wanning Crescent (after 26 days)
Wanning Gibbous (day 17)
New Moon (End of the Arabic month)
Full Moon (Second quarter) (after 14 days)
Waxing Crescent (Beginning of the Arabic month)
Waxing Gibbous (day 11)
First Quarter (after 7 days)

The eastern Illuminated part of the moon's side which faces the earth increases day by day as follows:

1-First Half of the Lunar (Arabic) Month

Moon's Visibility Time	Percentage of the Moon's Orbit	Name of the Phase	Appearance of the Moon
Beginning of the lunar month	⅛ of Moon's orbit	First (waxing) Crescent	A small part of the side of the moon is illuminated on the right side
After 7 days weekend	2/8 or ¼ of Moon's orbit	First Quarter	Half the side of the moon is illuminated on the right side
On the 11th day	⅜of Moon's orbit	Waxing Gibbo	3/4 the moon is illuminated on t right side
After 14 days (the middle of the lunar month)	4/8 or ½ of Moon's orbit (when the earth lies between the moon and Sun)	Full Moon (Second Quarter)	The moon's side which faces the ea is completely Illuminated (It appears as a complete bright disc)

What Happens When?ماذا يحدث متى؟

The earth is positioned between the Sun and the moon in the middle of the lunar month?

تقع الأرض بين الشمس والقمر في منتصف الشهر القمري؟

The moon appears as a complete bright disc, this phase is called the full moon phase

يظهر القمر كقرص كامل مضيء، وتسمى هذه المرحلة بمرحلة البدر

2- Second Half of the Lunar Monthالنصف الثاني من الشهر القمري

The western Illuminated part of the moon's side which faces the earth decrease day by day as follows:

يقل الجزء الغربي المضيء من جانب القمر المواجه للأرض يومًا بعد يوم على النحو التالي:

Moon's Visibility Time	Percentage of the Moon's Orbit	Name of the Phase	Appearance of the Moon
After 17 days	⅝ of Moon's orbit	Winning Gibbous	3/4 the moon is illuminated the left side
After 21 days (third weekend)	6/8 or 3/4 of Moon's orbit	Last (Third) Quar	Half the side of the moon is illuminated on the left side
After 26 days	7/4 of Moon's orbit	Second Crescent	A small part of the side of t moon is illuminated on the side
After 14 days (the middle of the lunar month)	Full Moon's orbit (The moon lies between the Sun and the Earth)	New Moon	The moon's side which face the Earth is completely dark (Opaque disc)

Determine the position of each of Sun, Earth and the moon during the new moon phase.

The Sun, the Earth and the moon are aligned (on one line), and the moon lies in the middle between Sun and Earth.

حدد موقع كل من الشمس والأرض والقمر أثناء مرحلة القمر الجديد.

تصطف الشمس والأرض والقمر على خط واحد، ويقع القمر في المنتصف بين الشمس والأرض.

Lunar Eclipseخسوف القمر

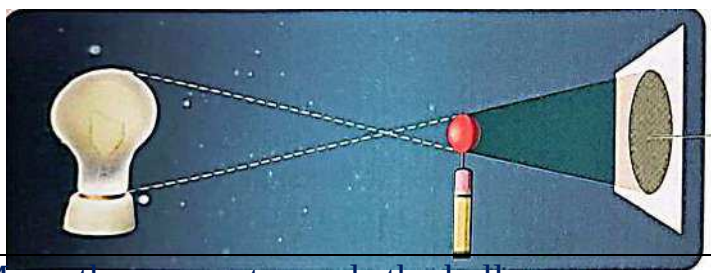
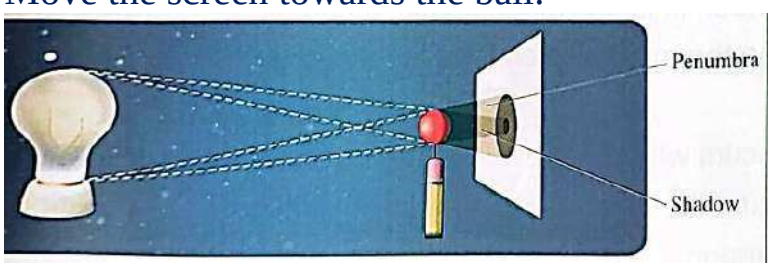
It is noticed once or twice a year that the moon in its full moon phase disappears gradually out of sight, this is called Lunar eclipse.

يلاحظ مرة أو مرتين في السنة أن القمر في طور البدر يختفي تدريجيا عن الأنظار، وهذا ما يسمى بخسوف القمر.

And to understand how the lunar eclipse happens, it is necessary to understand the concepts of the shadow and the penumbra which are clarified by the following activity:

ولكي نفهم كيف يحدث خسوف القمر، من الضروري أن نفهم مفهومي الظل وشبه الظل اللذين يتم توضيحهما من خلال النشاط التالي:

Practical Activity The formation of Shadow and penumbra

Steps	Observation
1-Place a light source (a lamp) in a dark room and direct it towards a white movable screen. 2-Place an opaque object, such as a ball, between the lamp and the screen.	A shadow of the ball is formed on the white screen.
Move the ball closer to or farther from the lamp. 	The shadow expands (increas in size) as the ball gets closer the lamp, and decreases in siz as It moves farther away.
Move the screen towards the ball. 	Two areas are formed on the white screen: * The dark area: Which is the shadow of the ball. * The partially lit area (surrounding the shadow of th ball): Which is the penumbra the ball.

Conclusion: The presence of an opaque object in the path of light rays leads to the formation of a dark area known as the shadow, surrounded by an area that receives some of the light rays, thus becoming partially illuminated, which is known as the penumbra.

النتيجة: وجود جسم معتم في مسار الأشعة الضوئية يؤدي إلى تكون منطقة مظلمة تعرف بالظل، محاطة بمنطقة تستقبل بعض الأشعة الضوئية، وبالتالي تصبح مضاءة جزئيا، والتي تعرف باسم شبه الظل.

Shadow The dark area that does not receive light as a result of the presence of an opaque object in the path of the light rays.

الظل المنطقة المظلمة التي لا تستقبل الضوء نتيجة وجود جسم معتم في مسار الأشعة الضوئية.

Penumbra The partially illuminated area that receives some of the light rays, which surrounds the shadow created by the presence of an opaque object in the path of light rays.

شبه الظل المنطقة المضاءة جزئيا والتي تستقبل بعض الأشعة الضوئية، والتي تحيط بالظل الناتج عن وجود جسم معتم في مسار الأشعة الضوئية.

Transparent object: Object that allows the light to pass through it, thus no shadow is formed.

.الجسم الشفاف: الجسم الذي يسمح للضوء بالمرور من خلاله، وبالتالي لا يتكون ظل

Opaque object: Object that does not allow the light to pass through it, thus a shadow is formed.

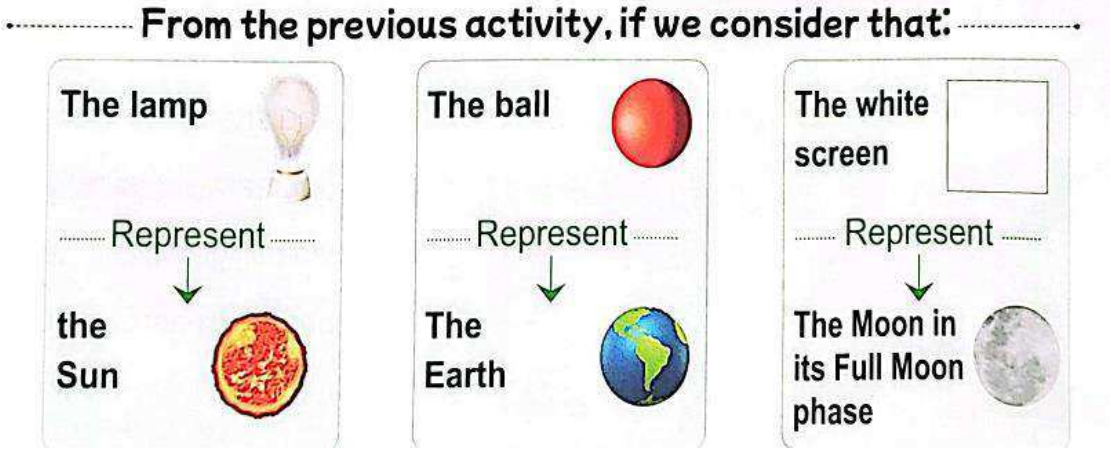
.الجسم المعتم: الجسم الذي لا يسمح للضوء بالمرور من خلاله، وبالتالي يتكون ظل

G.R. Even though an object is in the path of light rays, no shadow is formed on a screen placed in front of it.

Because it is a transparent object that allows the light to pass through it, so no shadow is formed.

.ج. ر. بالرغم من وجود الجسم في مسار الأشعة الضوئية، إلا أنه لا يتكون ظل على الشاشة الموضوعة أمامه

.لأنه جسم شفاف يسمح للضوء بالمرور من خلاله، وبالتالي لا يتكون ظل



Thus, when the earth, during its orbit around the Sun, aligns itself (positioned on the line) between the Sun and the moon in its full moon phase, it partially or completely blocks the sunlight from reaching the moon, which is called the lunar eclipse.

.وهكذا، عندما تصطف الأرض، أثناء مدارها حول الشمس، بين الشمس والقمر في طور البدر، فإنها تحجب ضوء الشمس جزئيًا أو كليًا عن الوصول إلى القمر، وهو ما يسمى بخسوف القمر

Lunar eclipse- A natural phenomenon that occurs when the earth, during its orbit around the Sun, aligns itself between the Sun and the moon, and so it blocks sunlight partially or completely from reaching the moon.

خسوف القمر- ظاهرة طبيعية تحدث عندما تصطف الأرض، أثناء مدارها حول الشمس، بين الشمس والقمر، وبالتالي تحجب ضوء الشمس جزئيًا أو كليًا عن الوصول إلى القمر.

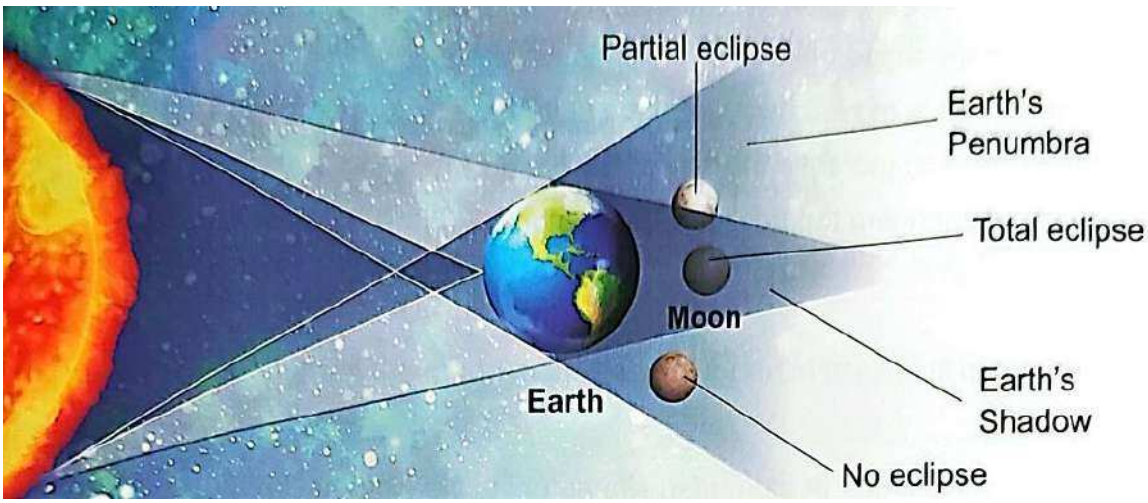
G.R.? Lunar eclipse does not occur every time the moon is in full moon phase.

Because the moon's orbit around Earth is tilted about 5 degree relative to the earth's orbit around the Sun, so the moon is not always align between the Sun and the Earth during every full moon.

هل يحدث خسوف القمر في كل مرة يكون فيها القمر في طور البدر.

لأن مدار القمر حول الأرض مائل بنحو 5 درجات بالنسبة لمدار الأرض حول الشمس، لذلك لا يكون القمر دائمًا محاذيًا بين الشمس والأرض أثناء كل اكتمال للقمر.

Types of Lunar eclipses.



Partial and Total lunar eclipses

Total lunar eclipse	Partial lunar eclipse
Location of the moon	
The entire moon is located within the shadow of the earth	A part of the moon's body is located within the shadow of the earth, while the other part is the penumbra of the earth
Appearance of the moon	
the moon appears as a dark due to the absence of sunlight	The moon appears partially dark

Unit (4) Lesson (2)

1-Write the scientific term for each of the following

The moon phases

1)An opaque body surrounding the Earth and is the closest celestial body to the Earth (…….)

2)An opaque body reflecting sunlight and completes its orbit around the Moon29.5 days (…….)

3)The different phases the moon goes through during the full moon(…….)

4) The phase of the moon at the beginning of each celestial phase (…….)

5) The phase in which the right half of the moon's side is illuminated (…….)

6) The phase of the moon on the 11th day of the Arabic month (…….)

7)The phase of the moon in the middle of the lunar month(…….)

8)The phase in which three-quarters of the left part of the moon's sides are illuminated (…….)

(9) The phase of the moon at the end of the third week of the lunar month (…….)

(10) The phase of the moon on the 26th day of the Arabic month (…….)

(11) The phase in which the moon is completely dark(…….)

(12) The phase of the moon at the end of the lunar month. (…….)

The lunar eclipse

(13) A phenomenon that occurs once or twice a year during the full moon phase, where the moon gradually disappears out of sight. (…….)

(14) The dark area that does not receive light as a result of the presence of an opaque object in the path of light. (…….)

(15) The partially illuminated area which surrounds the shadow where part of the light reaches (…….)

(16) Objects that allow light to pass through them. (…….)

(17) Objects that do not allow light to pass through them and cast shadows (…….)

(18) A natural phenomenon that occurs when the Earth, during its orbit around the Sun, aligns itself between the Sun and the Moon, and blocks sunlight from reaching the Moon partially or completely. (…….)

(19) A phenomenon that occurs when the Moon is completely within the Earth's shadow(…….)

(20) A natural phenomenon in which the Moon appears as a dark disc due to the lack of sunlight. (…….)

(21) A phenomenon that occurs when part of the Moon is in the Earth's shadow and the other part is in the Earth's penumbra. (…….)

(22) A natural phenomenon in which the Moon appears as a red disc, dimly (……)

2) Choose the correct answer:

The moon phases

(1) The moon appears illuminated in the sky at night, because…… ……
a)it reflects sunlight. b)it orbits around the ear
c)The moon rotates on its own axis. d)It is a luminous object.

(2) The closest celestial body to Earth is…….
a)the Sun. b) Venus. c)Mercury. d)the moon

(3) The moon takes approximately…… to complete its orbit around the Moon
a) 24 hours b)23.5 days c)88 days d)29.5 days

(4) The phases of the moon occur during the lunar month as a result of
a)the Sun orbiting around the moon. b) the moon orbiting around the Sun
c)the Earth orbiting around the moon. d) the moon orbiting around the Earth

(5) The number of phases that the moon goes through during the lunar month is…… phases
a)6 b)8 c)9 d)7

(6) The lunar phase cycle occurs every …….day approximately.
a) 27.32 b) 28 c) 29.5 d) 35

(7) The moon is in the……. phase when the right half of its side is illuminated
a)waxing crescent b)first quarter c)waning crescent d)last quarter

(8) On the 11th day of the Arabic month, 3/4 of the right part of the moon's side is illuminated, and this phase is called…….
a)waxing gibbous. b) first quarter. c)full moon. d) waning gibbous.

(9) In the middle of the lunar month, the moon is in the……. phase
a)waxing gibbous b)wanning crescent c)full moon d)new moon

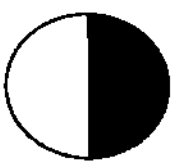
(10) The moon is seen as a full moon when it has completed its orbit around the Earth.
a) $\frac{1}{8}$ b) $\frac{1}{4}$ c) $\frac{1}{2}$ d) $\frac{3}{4}$

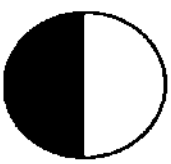
(11) After 17 days of the moon's orbit around the Earth, it becomes in the……. phase
a)waxing gibbous b)wanning crescent c)wanning gibbous d)last quarter

(12) The moon is in the last quarter phase when it completes……..of its orbit around the Earth.
a) $\frac{1}{4}$ b) $\frac{1}{3}$ c) $\frac{1}{2}$ d) $\frac{3}{4}$

(13) After three weeks of the lunar month, the moon's appearance becomes……

ⓐ


ⓑ


ⓒ

ⓓ

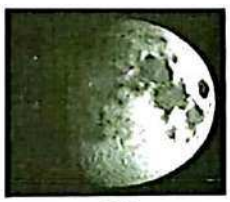
(14) The phase in which a small part of the moon's left side is illuminated is called the
a)waxing gibbous. b)wanning crescent c)wanning gibbous. (d) waxing crescent

(15) The moon's side that faces the earth is completely dark in……..
a)the beginning of the first week of the lunar month.
b)the middle of the lunar month.
c)the last day of the lunar month.
d)the end of the third week of the lunar month.

(16) Which of the following figures shows the moon in the new moon phase?

ⓐ

ⓑ


ⓒ

ⓓ

(17) During Ramadan, the crescent moon appears
a) once. b)twice. c)three times. d)four times.

Lunar Eclipse

(18) Which of the following describes the transparent objects?
a)They allow light to pass through them. B)They cast shadows
c)They do not cast shadows. d)a and c together

(19) When an opaque object is in the path of light rays, a dark area is formed, known as…… . a) the illuminated area. b) the shadow.
c)the penumbra. d) the semi-illuminated area.

(20) When the Earth aligns itself between the Sun and the Moon, the phenomenon of ……..occurs.
a) the day and night cycle b) no eclipse c)the lunar eclipse d) the season cycle

(21) A total lunar eclipse occurs when……
a) the Moon is entirely within the shadow area.
b) the Moon is entirely within the penumbra.
c)a part of the Moon is within the shadow area.
d) a part of the Moon is within the penumbra.

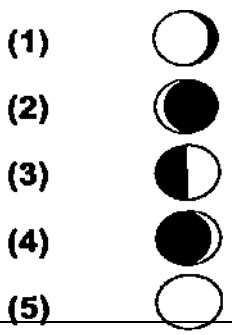
(22) The Moon appears incomplete in the……
a) total eclipse. b) full moon phase. c) partial eclipse. d) no eclipse.

(23) If the Moon is entirely within the Earth's penumbra, it appears as……
a)a full moon. b)a dark disc. c)a crescent. d)a red disc

3)Choose from column (B) what suits it in column (A):

(A)	(B)
(1) Total eclipse (2) Partial eclipse (3) No eclipse	(1) It occurs when the moon is completely within the shadow area (2) The moon appears as a red disc. (3) It occurs when the moon is in the new moon phase (4) The moon appears incomplete

4)Choose from columns (B) and (C) what suits them in column (A):

(A) Moon Phases	(B) The timing of appearance	(C) The Moon appearance
(1) Waxing crescent (2) Wanning gibbous (3) First quarter (4) Full moon (5) Wanning crescent	(1) On the 26th day of the lunar month (2) On the 14th day of the lunar month (3) At the beginning of the lunar month (4) On the 17th day of the lunar month (5) On the 7th day of the lunar month	

5)Complete the following statements:

Phases of the Moon

1) The …….. is the closest celestial body to Earth

2) The moon takes approximately……...to complete its rotation around its axis.

which is the same period taken to complete its orbit around……

3) The moon goes through……phases during its orbit around Earth.

4) The number of times the moon appears as a full moon during the lunar month is

(5) Half of the moon's night side becomes illuminated …… days after the beginning of lunar month

6) The moon is in the new moon phase when it is located between ……. .and ……while it is in the full moon phase when it is between …… and……

7) The…….. appears in the sky at the beginning of each lunar month, and it becomes a…… in the middle of the lunar month

(8) The moon is in the……. phase on the 11th day of the lunar month, and in the……. phase on the 21st day

(9) Ahmed looked at the moon and found it in the last quarter phase, so he concluded that…….. days had passed from the month of Sha'ban, and the moon had completed……of its orbit around Earth.

10) $\frac{3}{4}$ of The left part of the moon's side is illuminated during the…… … phase while $\frac{1}{2}$ the right part is illuminated during the ……..phase

(11) The moon has completed $\frac{7}{8}$ of its orbit around Earth in the…….. phase while in waxing gibbous phase, it has completed…….. of its orbit

(12) When the side of the moon facing Earth is fully illuminated, it is called……. While It is called …… when it is completely dark.

(13) The full moon phase occurs between the…… and …… phases, while the new moon phase occurs between the……. And…….

Lunar Eclipse

(14)……. Objects allow light to pass through them, While…… Objects don't allow light to pass through them.

(15) When an opaque object is placed in the path of light rays, two areas are formed on a screen placed in front of it, which are……..and ……..

(16) The shadow area increases when the opaque object ……to……and decreases when it…….

(17) There are two types of lunar eclipses, which are…… and…….

(18) The moon's orbit around …….. is tilted about ……..degrees relative to Earth's orbit around the sun.

(19) A……occurs when a part of the moon is within Earth's shadow, while……. a occurs when the entire moon is within Earth's shadow.

(20) The moon appears as a red disc when it is entirely in Earth's……, and as a dark disc when it is entirely in Earth's……

Correct the underlined words:

Phases of the Moon

(1) The moon orbits the Earth from south to west.

(2) The moon takes longer to complete its rotation around its axis than its orbit around Earth.

(3) The moon takes approximately 24 hours to orbit around the Earth.

(4) We do not see the moon during the full moon phase.

(5) At the end of the third week, the moon is in the first quarter phase.

(6) During Ramadan, the gibbous moon appears once, and the new moon appears twice.

(7) The night part of the moon's side is illuminated on the second day of the lunar month.

Lunar Eclipse

(8) Opaque objects do not cast shadows when placed in the path of light rays.
(9) A lunar eclipse occurs during the first quarter phase.
(10) The illuminated part of the moon during a partial eclipse is within Earth's shadow
(11) The moon appears as a bright disc during the total eclipse

Mark ( ) or (x) for each statement, with correction:

Phases of the Moon

(1) An observer on Earth sees several sides of the moon. ( )
(2) The moon's orbit around Earth takes the same time as Earth's orbit around the Sun ( )
(3) The moon itself does not change throughout the lunar month, only the bubonic part. ( )
(4) The moon undergoes the crescent phase twice during the lunar month. ( )
(5) Earth is located between the moon and the Sun in the middle of the lunar month. ( )
(6) The moon completes its orbit on the 26th day of each lunar month and is called the last quarter phase. ( )
(7) During the full moon phase, the moon has completed a full orbit around Earth. ( )
(8) The moon undergoes the new moon phase once during each lunar month. ( )

Lunar Eclipse

(9) The shadow of a wooden cube increases in size when it moves closer to the light source. ( )
(10) The area where part of the light rays reach is called the penumbra. ( )
(11) A lunar eclipse occurs once or twice a year when Earth blocks sunlight from reaching the moon. ( )
(12) A lunar eclipse does not occur during every full moon. ( ) (13) The moon's orbital plane around the earth is aligned with the earth's orbital plane around the Sun. ( )
(14) The dark part of the moon during a partial eclipse is in the earth's penumbra. ( )
(15) If the moon is completely within the earth's shadow, then this is not an eclipse. ( )

What is meant by:

(1) Phases of the Moon
(2) Shadow.

(4) Lunar Eclipse.
(5) Total Eclipse
(3) Penumbra
(6) Partial Eclipse.

Give reasons for each of the following:

Phases of the Moon

(1) An observer on Earth sees only one side of the moon.

……

(2) The moon appears illuminated in the sky, despite being dark.

……

(3) The appearance of moon phases during the lunar month

……

(4) The moon is called the first quarter at the end of the first week of the lunar month

……

(5) The moon appears as a full moon on the 14th day of the lunar month.

……

(6) The moon undergoes the crescent phase twice during the lunar month, while the full moon occurs once.

……

(7) The moon cannot be seen during the new moon phase.

……

(8) The moon cannot be seen at the end of the lunar month.

……

Lunar Eclipse

(9) A shadow is formed for an opaque object when placed in the path of light rays, while no shadow is formed for a transparent object.

……

(10) Although an object is in the path of light rays, no shadow is formed on the sc placed in front of it.

……

(11) A lunar eclipse can be either a total or a partial eclipse.

……

(12) A lunar eclipse does not occur during every full moon.

……

(13) The moon disappears during the total eclipse.

……

(14) The moon appears as a dark disc during the total eclipse

……

(15) The moon appears incomplete during the partial eclipse.

……

10. What are the consequences of:

Phases of the Moon

(1) The moon's rotation period on its own axis being equal to its revolution around the

……

(2) The change of the moon's position relative to Earth and the Sun during its revolution around Earth.

……

(3) The Earth being between the Moon and the Sun in the middle of the lunar month.

……

(4) The Moon being between the Earth and the Sun at the end of the lunar month.

……

Lunar Eclipse

(5) Placing a metal ball in front of light rays from a flashlight

……

(6) Moving an opaque object placed between a screen and a lamp farther from the lamp (in terms of: the shadow area).

……

(7) Bringing the screen closer to an opaque object placed in front of a light source.

……

(8) The Earth being aligned on the same line between the Sun and the Moon during the full moon phase.

……

(9) The moon being entirely within Earth's shadow.

……

(10) Part of the moon being within Earth's shadow as it orbits Earth.

……

(11) The moon being entirely within Earth's penumbra

……

11)Compare between each of the following:

(1) The full moon and the new moon phases.
(2) The first quarter and last quarter phases
(3) The waxing crescent and waning crescent phases.
(4) The waxing gibbous and waning gibbous phases.
(5) Shadow and penumbra.
(6) Total eclipse and partial eclipse "In terms of: The Moon's position - its appearance".

موقع الدكتور
محمد رزق
التعليمي

امسح الباركود بالموبيل لتثبيت
التطبيق وتحميل كل الملازم مجانا وبسرعه

MR

حمل التطبيق الأن

GET IT ON
Google Play

ملازم ابتدائي | ملازم اعدادي | ملازم ثانـــوي | كورسات ونتائج امتحانات

موقع الدكتور محمد رزق
Dr.MoRizK